Studio Vision®

Reference Manual for Pro and AV versions

OPCODE
SYSTEMS INC

Studio Vision®

Reference Manual for Pro and AV versions

OPCODE SYSTEMS INC

STUDIO VISION
REFERENCE MANUAL

-Supplement to the Vision Reference Manual-

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PART 1: Introduction

CHAPTER 1: Introduction

❑ About Studio Vision

Studio Vision is recording and sequencing software that combines all the MIDI sequencing capabilities of Opcode's sequencer, Vision, with the ability to record digital audio direct to disk. There are two versions of Studio Vision:

- **Studio Vision AV**: This version of Studio Vision works with the Macintosh's built-in sound features as well as consumer-level digital audio cards that use Apple's Sound Manager. It also works with DAE and all of Digidesign's Audiomedia cards.
- **Studio Vision Pro**: This version of Studio Vision works with all products supported by Studio Vision AV as well as with Digidesign's professional-level Sound Tools and Pro Tools audio hardware.

You can record both MIDI data and digital audio into Studio Vision tracks, listen to all data simultaneously, and edit it using many flexible editing procedures. All MIDI sequencing functions available in Vision are also available in Studio Vision, and all operations that function on MIDI events also function on audio if they are appropriate to the nature of audio. You can play back your recording direct from disk just by pressing Studio Vision's Play button.

Depending on the limits of your hardware, Studio Vision can record or play back between one and sixteen simultaneous audio channels. For example, with Sound Tools II you can record or play back up to four channels of simultaneous digital audio. With four Pro Tools systems and a System Accelerator, you can record or play back up to sixteen channels of simultaneous digital audio! See the manual that came with your audio hardware to find out the hardware's input and output capability.

Since all audio recorded by Studio Vision is digital, you can use Studio Vision to "mix down" audio from any number of tracks without any degradation in sound quality. You can then play the mixed signal out a single channel if desired.

NOTE: You **MUST** install and set up OMS before using Studio Vision; read the OMS manual for all necessary information about OMS.

❑ About the Studio Vision Manual

This manual is a supplement to your Vision Reference Manual. It discusses only those features related to digital audio. All basic MIDI recording, editing, and playback operations are discussed in your Vision Reference Manual and you should be familiar with those basics before attempting to work with digital audio.

This manual also assumes you're familiar with basic Macintosh operations and with OMS.

Navigating the Studio Vision Manual

The Studio Vision Reference Manual is divided into six parts:

- "Part 1: Introduction": All Studio Vision users should read these three chapters introducing you to Studio Vision.
- "Part 2: Setting Up, Recording, and Syncing with Sound Manager": Read this if you're using Studio Vision with Sound Manager; it teaches you how to set up, record, and sync with Studio Vision and Sound Manager. If you're using Studio Vision with DAE, you should read Part 3 instead.
- "Part 3: Setting Up, Recording, and Syncing with DAE": Read this if you're using Studio Vision with the Digidesign Audio Engine (DAE); it teaches you how to set up, record, and sync with Studio Vision and DAE. If you're using Studio Vision with Sound Manager, you should read Part 2 instead.

- "Part 4: Working with Digital Audio": All Studio Vision users should read this part. It teaches you how to edit audio events and work with digital audio within Studio Vision.
- "Part 5: Menu Reference": All Studio Vision users should read this part. It discusses new menu items added by Studio Vision, or menu items that may have a different connotation when used with digital audio events.
- "Part 6: Appendix": This part offers Studio Vision tips and trouble-shooting techniques.

Studio Vision Manual Conventions

This manual uses a number of conventions that make it easier to discuss and understand certain on-screen actions.

Mouse Actions

This manual uses the following terms to describe various mouse actions:

- **Click**: When the manual instructs you to *click*, position the mouse where you're told and press once on the mouse button, then immediately release it.
- **Double-click**: When the manual instructs you to *double-click*, position the mouse where you're told and rapidly press and release the mouse button twice.
- **Press and hold**: When the manual instructs you to *press and hold*, position the mouse where you're told, press the mouse button and hold it down until instructed to release it.
- **Release**: When the manual instructs you to *release*, let up on the mouse button (which you were probably holding down because of an earlier *press and hold* instruction).
- **Drag**: When the manual instructs you to *drag*, position the mouse where you're told, then press the mouse button and hold it down as you move the mouse.
- **Move**: When the manual instructs you to *move* the mouse, simply move it to another location on the screen without pressing its button.

Choose vs. Select

The words "choose" and "select" are often interchangeable in conversational English. In this manual, however, there is a distinct difference between the two terms.

- **Select**: When the manual tells you to "select" something, it stays selected. This is the case with most menu options.
- **Choose**: When the manual tells you to "choose" something, a one-time action is performed. This is the case with most commands; they perform their chosen action only once.

Menu Commands

This manual uses a shorthand technique to invoke various menu items. For instance, this manual might say:

"Select **Audio>Waveform Height>Tall**."

What this means in plain English is "select the **Tall** option from the **Audio** menu's **Waveform Height** submenu." Although the shorthand technique results in sub-standard grammar, it's easier to read and decipher than a complete sentence because it displays the menu's hierarchical structure plainly and simply.

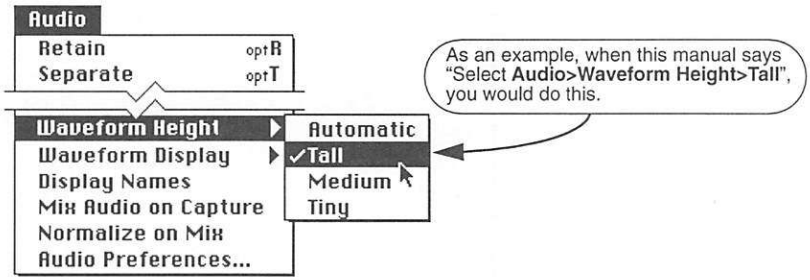


Figure 1.1: Shorthand Invocation of Menu Items

CHAPTER 2: Compatible Hardware

Studio Vision is designed to work with a wide variety of professional, semiprofessional, and desktop multimedia audio systems. Different audio hardware systems yield different results in terms of sample rates, resolutions, and the number of channels of audio they can play simultaneously. This chapter provides a quick look at some of the common Macintosh audio systems and how they work with Studio Vision.

❑ System Compatibility Table

Table 1 on page 8 shows a number of different digital audio systems and some basic information about those systems. Simply find your hardware in the left column and read across the row to get information about that hardware and its use with Studio Vision.

Each column in the table is described as follows:

- **Audio Hardware**: This column lists hardware that you can use to record and play digital audio with Studio Vision. This column lists both third party audio cards as well as Macintosh models with built-in audio.
- **Studio Vision Support**: This column shows which version or versions of Studio Vision support the hardware.
- **Audio System**: This column shows the recommended digital audio system you will use with the hardware. Studio Vision works with both the Digidesign Audio Engine (DAE) and Apple's Sound Manager (SM).

- **Sample Resolution**: This column shows the recommended sample resolution for each hardware entry.
- **Hardware Sample Rate**: This column shows the supported hardware sample rates for each hardware entry. You can use sampling rates other than the rates supported by your hardware, but with a slight decrease in audio fidelity.
- **Channels**: This column shows how many channels of digital audio will play simultaneously using the given sample resolution and sample rate. If you're using Apple's Sound Manager, this number is affected by sample rate and resolution. For example, you can increase the number of simultaneous channels by decreasing either the sample resolution or the sample rate.

Audio Hardware	Studio Vision Support	Audio System	Sample Res (in bits)	Hardware Sample Rate (in kHz)	Channels
Pro Tools	Pro	DAE	16	44.1, 48 (g)	16 (a,d)
Sound Tools II	Pro	DAE	16	44.1, 48 (g)	4 (d)
Sound Tools	Pro	DAE	16	44.1, 48 (g)	2 (b,d,k)
Audiomedia	Pro & AV	DAE	16	44.1, 48 (g)	4 (b)
Audiomedia II	Pro & AV	DAE	16	44.1, 48 (g)	4
Audiomedia LC	Pro & AV	DAE	16	44.1, 48 (g)	2 or 4 (j)
NuMedia card	Pro & AV	SM	16	44.1, 48	4 (c, f)
Power PC Mac	Pro & AV	SM	16	44.1	4 (c, h)
Quadra 840 AV	Pro & AV	SM	16	22.05, 24, 44.1, 48	4 (c)
Quadra 660 AV	Pro & AV	SM	16	22.05, 24, 44.1, 48	3 (c)
Quadras (non-AV)	Pro & AV	SM	8	22.254	4
Mac II class (68030 processors)	Pro & AV	SM	8	22.254	3
Performas & PowerBooks	Pro & AV	SM	8	22.254	3 (e)

Table 1: Studio Vision Hardware Support

Notes from Table 1:

- **a)** Each Pro Tools system supports four simultaneous channels of audio playback. Therefore, two systems support eight channels, three systems support 12 channels, and four systems support 16 channels. Using Studio Vision with multiple Pro Tools systems requires Digidesign's System Accelerator.
- **b)** Not all Macintosh models work with these systems. Consult Digidesign for a list of compatible computers.
- **c)** You can increase the number of simultaneous channels by decreasing either the sample resolution or the sample rate.
- **d)** Opcode recommends that all Digidesign audio hardware be used with DAE *not* Sound Manager because DAE is more efficient, provides more features, and offers greater control than Sound Manager.
- **e)** Performas and Powerbook Duos cannot record AND play digital audio simultaneously (with the exception of the PowerBook 180 and 180c).
- **f)** Four channels are possible using the NuMedia card with a Quadra, but only two channels are possible on a IIci (or similar 68030 machine).
- **g)** DAE supports both 44.1 kHz (CD standard) and 48 kHz sampling rates.
- **h)** Power PC Macs are untested at the time this manual was written. Look in the READ ME document on your Studio Vision Installer disk for more information about using Studio Vision with the Power PC Macs.
- **j)** The Audiomedia LC card allows 2 channels of simultaneous audio playback when used with the Macintosh LC and Macintosh LC II. It allows 4 channels of simultaneous audio playback when used with the Macintosh LC III or Quadra 605.
- **k)** The original Sound Tools was designed as a 2-channel digital audio system and Studio Vision treats it this way by default. If you want to experiment with trying to squeeze 4-channels out of an original Sound Tools system, you may do so as discussed in "Set Up the Audio Hardware" on page 72. You may, however, hear "crackling" or other undesirable audio problems when using 4-channel mode.

NOTE: This table is accurate at the time the manual was published. As more digital audio hardware becomes available, Studio Vision will support it. Always check your Installer Disk's READ ME file for the latest information about compatible audio hardware.

CHAPTER 3: Feature Overview

❑ Feature Overview

Non-Destructive Editing and Audio Events

All audio editing in Studio Vision is non-destructive—audio you record to disk remains unaltered until you choose to remove it.

The Graphic and Tracks windows display representations of actual waveform data, which you can cut, copy and paste using typical Macintosh editing procedures. The List window displays data in a chronological numeric list. The data you edit in Studio Vision is not hard disk data, but pointers to the actual data. You can create many edited versions of the original recording without increasing hard disk usage because you're merely creating different sets of playback instructions (which take up virtually no space).

The instructions you edit—either graphically as a waveform or as numerical information in the List window—are called audio events. You can manipulate audio events as you do note events. Unlike working with note events, however, an audio event may be an entire waveform or, if you choose to break it up for more editing flexibility, it may be a section of a waveform.

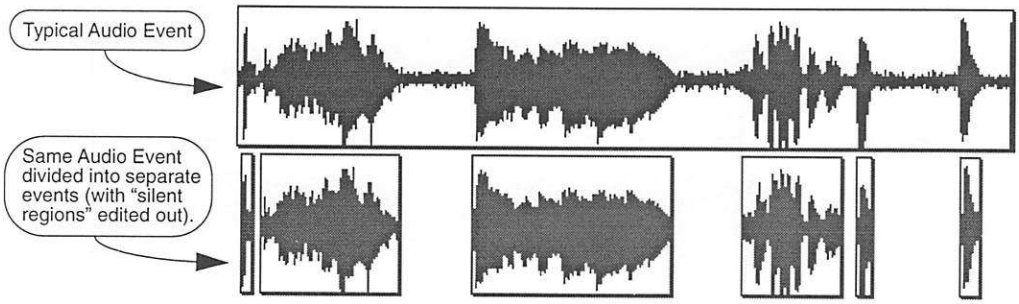


Figure 3.1: Non-Destructive Editing of "Audio Events"

The "perfect take" you create is merely a series of instructions that point to locations on the hard disk where the original is stored. You manipulate instructions to Studio Vision of where on the hard disk to play back from, not actual audio data in files.

There are only six operations (other than recording) that will actually affect hard disk data:

- **Delete File** (in the File Management dialog box) destroys data by removing it from your hard disk.
- **Compact** (in the File Management dialog box) destroys data by altering it on your hard disk.
- **Consolidate** (in the File Management dialog box) copies data, adding new files to your hard disk.
- **Sample Rate Convert** (in both the File Management and Conversion Overview dialog boxes) copies data, adding new files to your hard disk.
- **Deinterleave** (in both the File Management and Conversion Overview dialog boxes) copies data, adding new files to your hard disk.
- **Mix Audio** (in the **Audio** menu) copies data, adding new files to your hard disk.

Displaying Audio Events

Studio Vision allows you to graphically display audio events in Fast mode, High Resolution mode, or to simply turn the display of all waveforms off. You can choose different displays from the **Audio>Waveform Display** submenu.

Fast mode displays a summary of the waveform rather than each individual sample. This mode allows Studio Vision to redraw waveform displays quickly, which is especially desirable when you're recording or playing back audio.

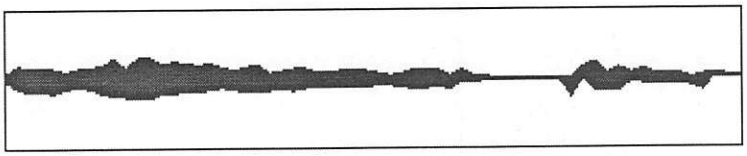


Figure 3.2: Fast Redraw Display

High Resolution mode displays each individual sample in your waveform (if you zoom in enough). This is slower than Fast mode, but is beneficial for precise editing since you can see all of a waveform's peaks and valleys.

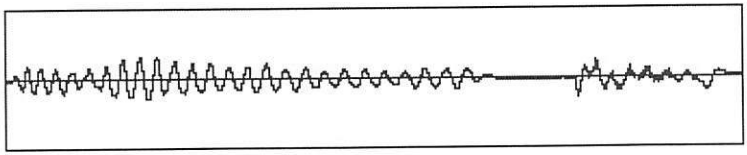


Figure 3.3: High Resolution Display

NOTE: When zoomed out, Studio Vision reads only the waveform summary (just as with Fast Redraw mode). Therefore, redrawing is performed at the same speed as Fast Redraw when zoomed out.

Audio Instruments

Audio Instruments are like IDs, which you assign to particular events, or groups of events, in order to identify them for playback purposes and for associating volume and pan values to them. In this way, Audio Instruments are analogous to Vision's MIDI Instruments.

Depending on your audio hardware, Studio Vision may play back as many as sixteen channels of audio simultaneously; however, you must assign different Audio Instruments to them if they are on the same track.

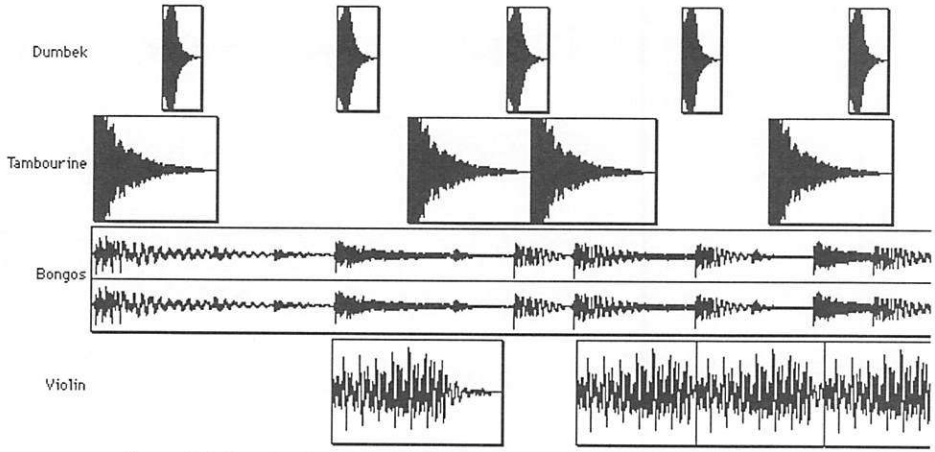


Figure 3.4: Four Audio Instruments in a Graphic Window

Studio Vision displays each Audio Instrument in the Graphic window in its own row, with the name of the Instrument in the left margin. You can name Audio Instruments in the Audio Instrument window.

You can record, import, or copy up to sixteen Audio Instruments into a Graphic window as you want and you can easily reassign audio events to new Audio Instruments.

If you have various takes you want to compare and perhaps cut and paste between, you might want to put them all in the same Graphic window for convenience. You can use the **Audio>Separate** command to separate the takes into multiple events, then pick and choose the best takes to assemble into a new track.

You can also use Audio Instruments to mute or solo audio events associated with particular Audio Instruments (in the Audio Instruments window) or use Audio Instruments to associate volume and pan with audio events (in the Strip Chart, List window, or Faders window). You can control volume and pan using Studio Vision's faders, or remotely from your synthesizer or MIDI fader unit.

Audio Instruments are discussed in "Chapter 15: Working with Audio Instruments". Volume and pan adjustments are discussed in "Chapter 16: Adjusting Volume and Pan".

File Management

Studio Vision's non-destructive editing capabilities maximize hard disk storage efficiency. For example, duplicating multiple sections of a sound in a sequence does not increase hard disk space—the actual audio data remains intact during edit operations and what you manipulate are pointers to the data; instructions to Studio Vision of which data on the disk to play.

You can optimize hard disk storage using commands available from the File Management window. For example, you can delete unwanted files, or merely delete the data in a file that's unused by the current sequence.

For details on File Management, see "Chapter 20: File Management".

File Formats

Digital audio recorded by Studio Vision and DAE is stored in Sound Designer II format. Digital audio recorded by Studio Vision and Sound Manager is stored in AIFF format. However, Studio Vision can play back audio stored in any of the following file formats:

- Sound Designer
- Sound Designer II
- AIFF
- Dyaxis

You can view file format information about all files used in the current sequence by choosing **Audio>File Management**. You can view information about individual audio events by selecting the event and choosing **Audio>Get Event Info**.

PART 2: Setting Up, Recording, and Syncing with Sound Manager

CHAPTER 4: Overview of Sound Manager Procedures

Studio Vision can work with either Apple's Sound Manager or with the Digidesign Audio Engine (DAE). Sound Manager and DAE are digital audio systems that Studio Vision uses to record and play digital audio. Studio Vision uses the digital audio system to control digital audio in much the same way that it uses OMS to control MIDI communications.

This chapter discusses how to set up Studio Vision for use with Sound Manager. If you wish to use Studio Vision with DAE instead of Sound Manager, see "Part 3: Setting Up, Recording, and Syncing with DAE".

See Table 1 on page 8 to determine whether you want to use Sound Manager or DAE.

❑ About Sound Manager

Sound Manager is a system extension created by Apple that provides a method for playing and recording multiple tracks of digital audio. Studio Vision controls Sound Manager, and Sound Manager in turn controls the audio.

Using Sound Manager is automatic and transparent. But it is important to realize that it is there, running "behind the scenes" to control the digital audio signals.

❑ System Requirements for Studio Vision with Sound Manager

To run Studio Vision Pro with Sound Manager, you must meet the following computer requirements:

- A compatible Macintosh (with a 68020 microprocessor or better).
- A minimum of 6 Megabytes of RAM.

  —Studio Vision requires 3.5 Megabytes.

  —Sound Manager requires a minimum of 0.5 Megs for 2 channels.

  —Your System software requires approximately 2 Megabytes.

  These are minimum requirements—Opcode recommends you use more RAM if possible.
- A Macintosh with built-in audio capabilities or a Sound Manager compatible Macintosh digital audio card (such as a NuMedia card).
- A hard disk that's fast enough to record and play back digital audio (see the hard disk compatibility chart included with Studio Vision), and is reasonably defragmented (defragmentation software is encouraged).
- Macintosh System 7.0 or later.

  If you use System 7.0, you'll need to use QuickTime 1.6 or later. If you use System 7.1 or later, you don't need to use QuickTime.
- OMS
- 32-bit memory addressing needs to be on.
- Apple's Sound Manager extension (version 3.0 or higher) must be in the Extensions folder (in the System Folder). AV Macintosh models have Sound Manager built into the system enabler.

❑ OMS, Studio Vision & Sound Manager Interaction

If you plan to make frequent changes to the Sound Control Panel while using Studio Vision, you may wish to keep both the Sound Control Panel and Studio Vision open simultaneously. If this is the case, you should set the OMS compatibility mode to "Allow Non-OMS Applications." This compatibility mode allows you to use the Finder to switch between Studio Vision and the Sound Control Panel. It also enables you to record into Sound Manager from other applications if you wish to do so.

If you set the OMS compatibility mode to "Only OMS Applications," then you can open and change the Sound Control Panel only from within Studio Vision (by choosing **Audio>Hardware Setup**). If, in this mode, you open the Sound Control Panel from the Finder, you will not be able to modify its parameters or use it with other applications.

To set the OMS compatibility mode:

1. **Choose Options>OMS MIDI Setup.**

   The OMS MIDI Setup dialog box opens.
2. **Click either the "Allow Non-OMS Applications" or "Only OMS Applications" radio button.**

   Your choice depends on how you like to work, as outlined in the previous paragraphs.
3. **Click the OK button.**

For more information about OMS and the OMS MIDI Setup dialog box, see your OMS manual.

❑ Power User Overview

This section provides quick step-by-step instructions on how to set up and record digital audio using Apple's Sound Manager. Confident users may find this is all the instruction they need. If you need more information, additional details about each step are discussed in later chapters.

STEP 1: Set up your audio recording hardware (See "Chapter 5: Hardware Setup with Sound Manager" for details):

1. **Make sure you've properly connected any external digital audio hardware, microphones, etc.**

   A good way to check your connections without launching Studio Vision is to try recording and playing from within the Sound Control Panel.
2. **Before launching Studio Vision, open the Sound Control Panel, tell it about the audio hardware you're using, close it and launch Studio Vision.**

   Alternately, you could first launch Studio Vision, then choose **Audio>Hardware Setup** to open the Sound Control Panel from within Studio Vision.

3. **If you haven't already done so, launch Studio Vision and select Audio>Audio System>Sound Manager to use Studio Vision with Sound Manager.**
4. **Choose Audio>Buffer Size to tell Studio Vision how much RAM you want reserved for the digital audio buffer.**
5. **Choose Audio>Sample Rate to tell Studio Vision what sampling rate you want to use for recording audio.**

   For optimum audio performance, the session sample rate should match the hardware sample rate.

STEP 2: Set record levels (See "Set Record Levels" on page 37 for details):

1. **Choose Windows>Record Monitor to set your audio input levels.**
2. **Decide whether or not you need to use the Audio Thru option.**

   When this option is checked, Studio Vision sends the audio signal arriving at the input directly to the output of an audio channel so that you can hear the signal you're recording. Generally, you'll use Thru when you bypass a mixing console. Otherwise, audio routing is handled by your console.
3. **Watch the volume input level display and adjust your signal source as appropriate.**

STEP 3: Designate a record file (See "Designate a Record File" on page 41 for details):

1. **Record enable an input channel by clicking its Record Enable Indicator in the Record Monitor window.**
2. **Studio Vision opens a standard Macintosh Save As dialog box.**
3. **Designate the file that will be used to store the audio you record. Do this by either typing a new file name, or selecting an existing file from the scrolling list.**

   Use the dialog box's **Append to File** button if you want to add what you record to the contents of an existing file.
4. **If you're recording in stereo, select the Stereo option.**
5. **Determine whether or not you need to use the Auto Compact option.**

   This option causes Studio Vision to automatically compact files when you record them.
6. **Select which Audio Instrument will play back the audio event you record.**

STEP 4: Record a track (See "Record a Track" on page 50 for details):

1. **Record enable a track by clicking in the Tracks window Record column.**
2. **Select a Record mode from the Control Bar.**

3. **In the Control Bar, select either Countoff or Wait for Note mode.**

   If you choose Wait for Note, you'll have to press the Spacebar to start the Counter if you're not also recording MIDI notes.

4. **Click the Record button and begin to play or sing into your digital audio hardware.**

5. **When you're finished, click the Stop button.**

   Studio Vision records audio and displays it in a graphic window using the selected **Audio>Display Waveform** option.

STEP 5: Save the sequence (See "Save the Sequence" on page 52 for details):

1. **Choose File>Save.**

   Studio Vision saves all your audio events with the current sequence file. The next time you open the sequence file, Studio Vision will locate the necessary digital audio files and play them back.

CHAPTER 5: Hardware Setup with Sound Manager

This chapter discusses how to set up Studio Vision to work with your Sound Manager-compatible audio hardware. If you're using Studio Vision with DAE-compatible hardware, read "Chapter 10: Hardware Setup with DAE" in place of this chapter.

❑ Set Studio Vision to Sound Manager Mode

To use Studio Vision with Sound Manager, select **Audio>Audio System>Sound Manager** to place a check mark next to the option.

❑ Allocate RAM

Unlike most Macintosh applications, Studio Vision requires two separate RAM allocations:

- **Application RAM**: This is the amount of RAM required to run the Studio Vision application.
- **RAM Buffer**: This is the amount of RAM required to temporarily store digital audio while recording or playing.

The following sections discuss how to allocate RAM to both areas.

Allocating Application RAM to Studio Vision

Allocate RAM to Studio Vision using the standard Macintosh technique. Specifically:

1. **Click the Studio Vision application icon to select it.**
   Don't double-click it or you'll actually run the application.
2. **Choose File>Get Info.**
   A standard Get Info window appears.
3. **In the Get Info window, allocate as much of your available memory as possible to Studio Vision.**
   Opcode recommends that you assign at least 3500K to Studio Vision.
4. **Click the close box to close the Get Info window.**

Allocating RAM to the Digital Audio RAM Buffer

In addition to the RAM required to run the Studio Vision application, you'll need to set aside memory for use as a RAM buffer. Sound Manager uses the RAM buffer to store digital audio temporarily before sending it to your hard disk, or before playing it.

IMPORTANT: Don't confuse the RAM buffer with the application RAM size. The RAM buffer determines the amount of RAM dedicated to temporarily storing digital audio—the application size determines the amount of memory dedicated to Studio Vision. When you set a RAM buffer size, Studio Vision will attempt to allocate its application RAM to the digital audio buffer, but if you ask for a larger buffer than Studio Vision can spare, it will use additional RAM outside of Studio Vision.

Determining the Best RAM Buffer Size

There are five RAM buffer sizes ranging from "Minimum" to "Huge."

When the RAM buffer is small, your Macintosh will need to access the hard disk frequently. When the RAM buffer is large, your Macintosh will store more digital audio in RAM, and will not need to access your hard disk as often. However, you may notice that it takes longer to start and stop playing digital audio. This is because your Macintosh needs to fill the buffer with digital audio from your hard disk. If you have a large RAM buffer, this will take longer.

In general, you should set the RAM buffer to the largest size your system allows. If you're bothered by the time lag mentioned above, try a smaller setting. If, after you decrease the buffer size, you get timing and performance errors, increase the buffer size.

Setting the RAM Buffer

To set the RAM buffer size:

1. **Choose Audio>Buffer Size.**
   Studio Vision opens the Buffer Size dialog box.

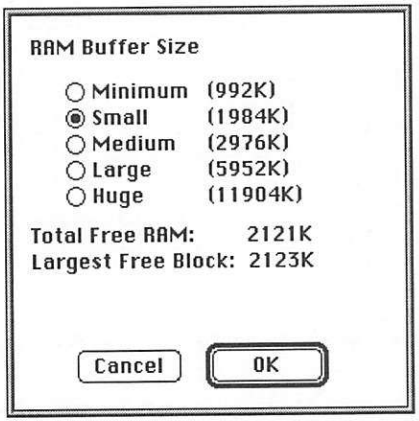


Figure 5.1: Typical Buffer Size Dialog Box for Sound Manager

2. **Select the largest RAM size that is appropriate for your system.**
   See "Determining the Best RAM Buffer Size" on page 26 to help you choose which setting is most appropriate.
3. **Click the OK button.**
   The selected amount of RAM is set aside for use as a digital audio RAM buffer.

❑ Set Up the Audio Hardware

Before you can record and play digital audio, you must tell the Sound Manager what digital audio hardware you're using. To do so:

1. **Choose Audio>Hardware Setup.**

   The standard Apple Sound Control Panel opens. Studio Vision calls this the "Hardware Setup" dialog box for Sound Manager.

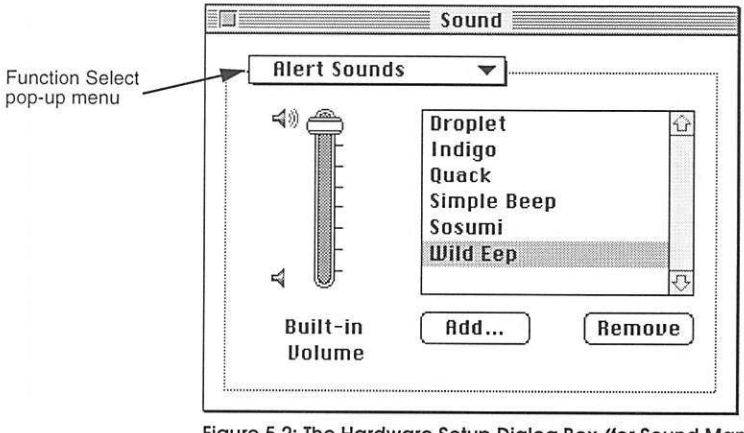


Figure 5.2: The Hardware Setup Dialog Box (for Sound Manager)

Alternately, you could open the Sound Control Panel directly from the Finder. If you do this, OMS must be set to a compatibility mode of "Allow Non-OMS Applications" in order to change settings in the Sound Control Panel (as discussed in "OMS, Studio Vision & Sound Manager Interaction" on page 20).

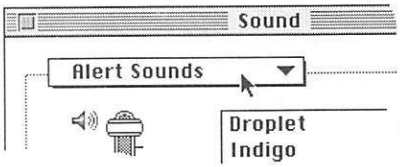
About the Hardware Setup Dialog Box

As shown in Figure 5.2, the Hardware Setup dialog box contains numerous elements. Using this dialog box, you can enable a sound input device, establish sound output parameters, and volume. The following sections discuss each element in detail.

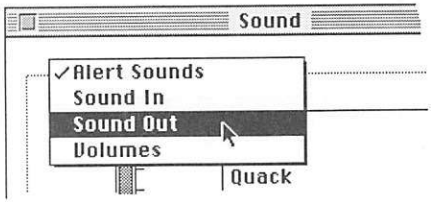
Selecting a Function

You determine the function of the dialog box by selecting it from the Function Select pop-up menu. To do so:

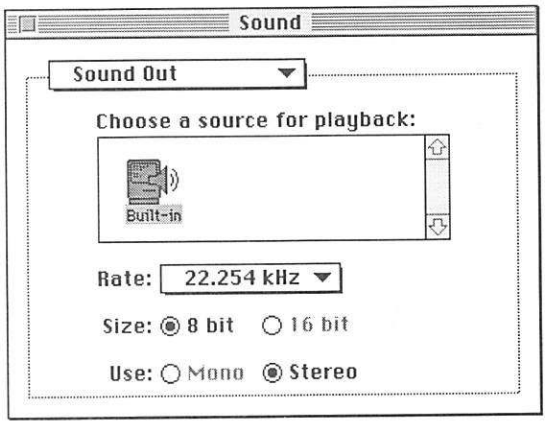
1. **Move the mouse over the pop-up menu.**



2. **Press and hold the mouse on the menu.**
   You're presented with a pop-up menu of choices.



3. **While still holding the mouse button, move the cursor over the desired function (highlighting it) and release the mouse button.**
   The parameters change to those that relate to the selected function.



Sound In Functions

Choosing **Sound In** from the Function Select pop-up menu allows you to configure Sound Manager's input parameters.

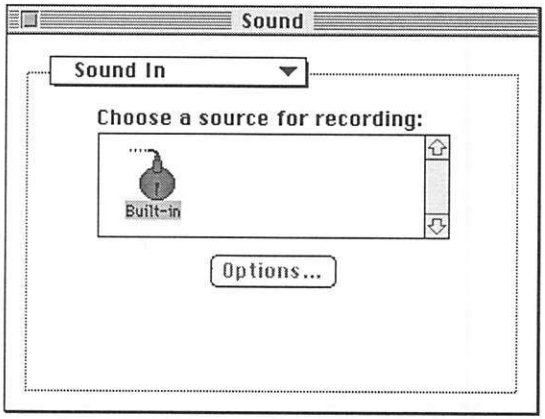


Figure 5.3: Sound In Parameters in Sound Control Panel

Click the icon of the Sound Manager-compatible hardware you wish to use to record digital audio, highlighting it. If the selected hardware has any additional input options, the **Options** button will become enabled. Click it to access additional input parameters. See your hardware manual to learn about its various input options.

The dialog box contains an icon for each input device recognized by Apple's Sound Manager. If you're using only the Macintosh's built-in audio, you will see only the "Built-In" choice.

Sound Out Functions

Choosing **Sound Out** from the Function Select pop-up menu allows you to configure Sound Manager's output parameters.

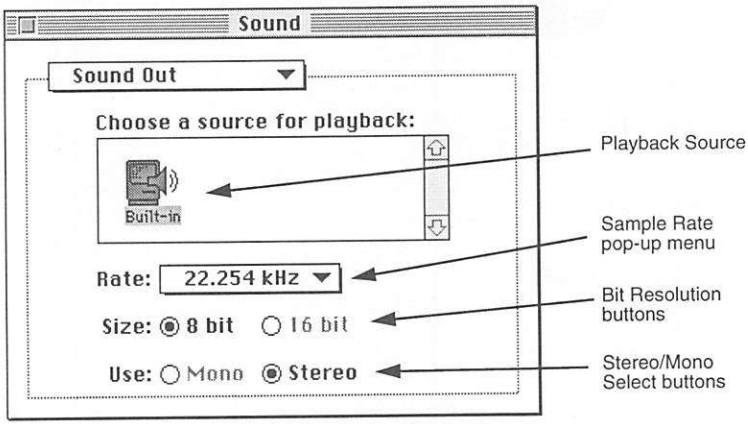


Figure 5.4: Sound Out Parameters in Sound Control Panel

As shown in Figure 5.4, the Sound Control Panel contains numerous elements when displaying Sound Out parameters. These are:

- **Playback Source**: Click the icon of the Sound Manager-compatible hardware you wish to use to play back digital audio, highlighting it. The dialog box contains an icon for each output device recognized by Apple's Sound Manager. If you're using only the Macintosh's built-in audio, you will see only the "Built-In" choice.
- **Sample Rate Pop-Up Menu**: From the Sample Rate pop-up menu, choose the desired *hardware sample rate*.

  The hardware sample rate is the number of times per second that an audio value will be read from your hard disk.

  In general, you'll obtain the best audio quality if your hardware sample rate matches your session sample rate (as discussed in "Set a Session Sample Rate" on page 33).
- **Bit Resolution buttons**: Click the radio button for the desired playback resolution. This option may be disabled depending on your Macintosh model or audio hardware.
- **Stereo/Mono Select buttons**: Click the radio button for the desired playback use (mono or stereo). This option may be disabled depending on your Macintosh model or audio hardware.

Volume Functions

Choosing **Volume** from the Function Select pop-up menu allows you to set the output volumes of your Sound Manager compatible hardware.

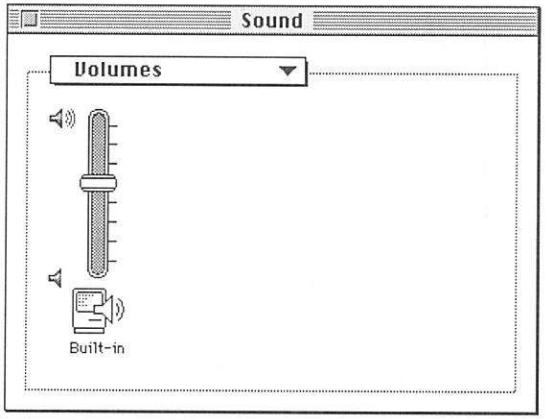


Figure 5.5: Volume Parameters in Sound Control Panel

The dialog box contains an icon for each output device recognized by Apple's Sound Manager. If you're using only the Macintosh's built-in audio, you will see only the "Built-In" choice.

Above each device icon is a volume "fader". Drag the fader up to increase a device's output volume; drag it down to decrease the volume.

Effects Functions

Some AV Macintosh models include an additional function selection for **Effects**. If you use effects with Sound Manager, you *cannot* record using Studio Vision. Therefore, do not select any effects if you wish to record using Studio Vision with Sound Manager.

Using the Hardware Setup Command

To set up your audio hardware:

1. **Choose Audio>Hardware Setup.**
   Studio Vision opens the Sound Manager control panel.
2. **Select Sound In from Function Select pop-up menu.**

3. **Click the desired input device to enable it.**
   If necessary, configure any input options by clicking the Options button.
4. **Select Sound Out from the Function Select pop-up menu.**
5. **Click the desired output device to enable it.**
6. **Select the desired sample rate, bit depth, and output mode.**
7. **Select Volume from the Function Select pop-up menu.**
8. **Drag the fader to set the desired output volume for the device.**
9. **Click the close box in the upper left corner to close the Sound Control Panel.**

❑ Set a Session Sample Rate

Now that you've told Studio Vision about your audio hardware, you'll need to determine a session sample rate before you can record. This is the sample rate Studio Vision uses to record and playback audio.

The term "sample rate" refers to the number of audio samples that comprise 1 second worth of audio. Higher session sample rates produce better audio fidelity, but use more disk space (because there are more sample points per second). You can save disk space by using a low sample rate, but this degrades the audio fidelity.

It's important to recognize that there is a difference between the hardware sample rate (as discussed in "Sound Out Functions" on page 31) and the session sample rate. Specifically:

- The **Hardware Sample Rate** is the sample rate that your hardware uses to play back audio files. Your audio hardware works at only one of a few preset sample rates. See your hardware manual to learn what sample rates it supports.
- The **Session Sample Rate** is the sample rate that is common to all audio files referenced by a sequence. In Studio Vision, all audio events in a sequence file must have the same sample rate. If that rate is different than the Hardware Sample Rate, Studio Vision will convert the audio to the Hardware Sample Rate during playback, and this can affect the fidelity of the audio.

You will obtain the best audio quality if your hardware sample rate and session sample rate are the same.

Apple's Sound Manager can play back audio at any sample rate, but recording is limited to a sample rate that's acceptable to the input device.

To set a session sample rate:

1. **Choose Audio>Sample Rate.**
   Studio Vision opens the Set Session Sample Rate dialog box.

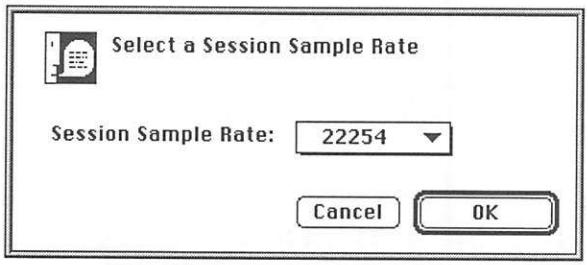
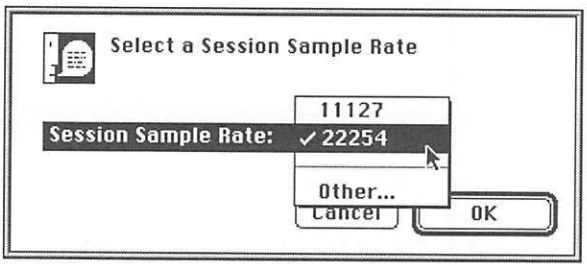


Figure 5.6: Set Session Sample Rate dialog box

2. **From the Session Sample Rate pop-up menu, select the desired session sample rate.**
   This menu lists the current sample rate, any hardware sample rates supported by your digital audio hardware, and the sample rates of all audio files in the current sequence.



Generally, you will want to set the session sample rate to match the hardware sample rate. To view the hardware sample rate, open the Sound Control Panel. If you wish to *change* the hardware sample rate, you must either use the **Audio>Hardware Setup** command, or open the Sound Control Panel from the Finder with OMS set to "Allow Non-OMS Applications" compatibility mode. For more information about OMS and the Sound Control Panel, see "OMS, Studio Vision & Sound Manager Interaction" on page 20. For more information about setting a hardware sample rate, see "Set Up the Audio Hardware" on page 28.

You can, if desired, set a session sample rate other than one of the listed rates. To do so, choose "Other" from the pop-up menu; Studio Vision opens the Set Other Rate dialog box.

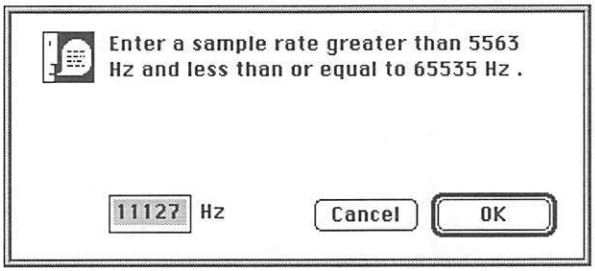


Figure 5.7: Set Other Rate Dialog Box

Automatic Sample Rate Setting for Existing Sequences

When you open an existing sequence, Studio Vision will automatically set both the session sample rate and the hardware sample rate if the following conditions are met:

- *all* audio files referenced by the sequence have the same sample rate

  AND
- this sample rate matches one of the available hardware sample rates

If both these conditions are met, Studio Vision automatically sets the session sample rate and hardware sample rate to match the sample rate of the audio file(s).

CHAPTER 6: Recording Audio with Sound Manager

This chapter discusses how to record into Studio Vision with your Sound Manager-compatible audio hardware. If you're using Studio Vision with DAE-compatible hardware, read "Chapter 11: Recording Audio with DAE" in place of this chapter.

❑ Set Record Levels

Open the Record Monitor Window

To test the amplitude of your signal and set up Studio Vision to record audio:

1. **Choose Windows>Record Monitor.**
   Studio Vision opens the Record Monitor window.

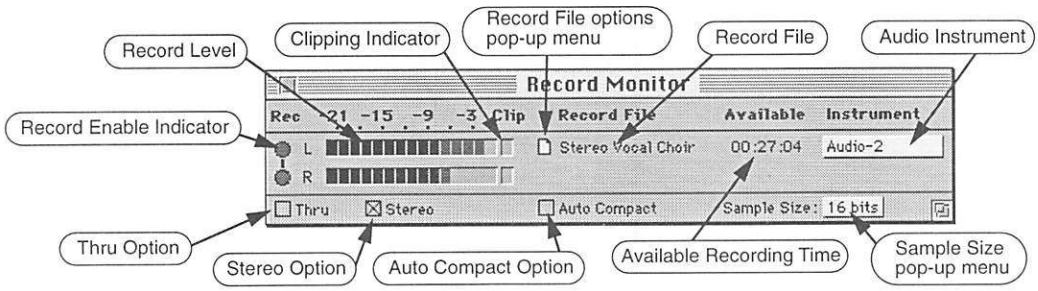


Figure 6.1: Record Monitor Window for 2-Input Stereo Audio System

TIP: You can also open the Record Monitor window directly from the Control Bar by double clicking the Record Indicator icon ( ).

The appearance of the Record Monitor window changes depending on the type of hardware you're using. Figure 6.1 shows a Record Monitor window for a Macintosh with built-in stereo-recording capabilities. Other hardware configurations are discussed later.

IMPORTANT: The Record Monitor window must remain open in order to record audio.

About the Record Monitor Window

As shown in Figure 6.1, there are numerous elements in the Record Monitor Window. Among these are:

- **Record Levels**: Use this area to view the audio input level when recording audio.
- **Clipping Indicators**: This indicator lights when an audio level exceeds 0 dB and stays lit until you reset it by clicking anywhere within the Record Level indicator for the offending channel.
- **Record Enable Indicators**: Click a Record Enable Indicator to record the audio arriving at the corresponding input. When an input channel is record-enabled this indicator is solid red. The indicator flashes red if Studio Vision is in play mode, and has the possibility of recording (such as with punch-in)—it then turns solid red when Studio Vision begins to actually record.
- **Record File Options**: Press and hold this icon to open a pop-up menu of record file options. These options let you create new record files, append to existing files, or close a record file.
- **Record Files**: This column shows the name of the file to which audio data is recorded.

- **Audio Instruments**: Use this column to select an Audio Instrument for each input channel (or stereo pair). Use Audio Instruments to group related audio events, to associate controller data with specific events, to assign different audio channels to particular events so that multiple events in the same track can sound simultaneously, and to associate events with particular outputs.
- **Thru** Option: Check this option if the signal you're recording is patched directly into your audio hardware without first going through a mixing console. When this option is checked, Studio Vision sends the audio signal arriving at the input directly to the output of an audio channel so that you can hear the signal you're recording. If you're using a mixing console, use it to route audio signals and leave this option unchecked.
- **Auto Compact** Option: Choose this option to automatically compact audio during recording. Compacting frees disk space by throwing out audio data that's unreferenced by the current sequence file (such as data from discarded "takes").
- **Sample Size** pop-up menu: Use this pop-up menu to select the sample bit depth of the file you're about to record. Higher numbers result in better audio quality but use more disk space.
- **Stereo** Option: Choose this option to link two input channels together to create a single, stereo *interleaved* audio event.

Record Monitor Window for Macintosh with Mono Inputs

If you're using audio hardware or a Macintosh with only one input channel, the Record Monitor window contains only a single line as shown below.

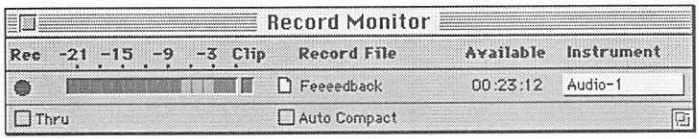


Figure 6.2: Record Monitor Window for a 1-Input Audio System

Since you have only one input available, the stereo option disappears. Also, if your audio hardware or Macintosh supports only 8-bit recording, the Sample Size pop-up menu disappears, too.

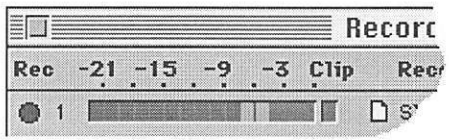
Optimizing An Input Level

The Record Level portion of the Record Monitor window functions like an LED display. Whether you're recording or not, the amplitude level of the incoming signal causes the level indicator to move, showing you the amplitude graphically and in decibels.

You'll obtain the best signal-to-noise ratio by adjusting the peak amplitude to between -3 and 0 decibels (0 is the last dot before clipping). Zero decibels is equal to the maximum volume of 16 bit resolution. Decibel numbers represent the number of decibels below maximum volume.

Before you record enable a track, you should adjust your audio input level by watching the level indicator. To do so:

1. **Speak into your microphone or send whatever your signal may be.**
2. **Watch the level indicator move.**



3. **Adjust the level you're sending, keeping the amplitude peaks above -3 dB but below clipping.**

   If you're using a color monitor, you'll notice the bar is green within a low amplitude, yellow in the -3 to 0 range (the best range), and red when the signal is too loud and it clips. The Macintosh's built-in audio contains gain control that automatically keeps the input signal from clipping.

Avoiding Clipping

If the amplitude of the audio signal exceeds the dynamic range of 16 bit audio, the waveform peaks become chopped off and flat (like a square wave), and the audio will sound buzzy and distorted. This is called "clipping," which you will most always want to avoid. If you're accustomed to analog recording, you'll soon notice that digital clipping is harsher and much less tolerable than analog clipping.

If you clip the volume so the amplitude exceeds 0 dB, the Record Monitor's clipping indicator lights at that moment. After the level recedes, the clipping indicator remains lit to remind you that you clipped the input level and you should go back and adjust it. When you're ready to try a different input level, you can clear the clip light by clicking anywhere in the record level indicator.

NOTE: The Macintosh's built-in audio contains gain-control that automatically keeps the input signal from clipping.

Monitoring the Input

If you're recording directly into your audio hardware without running the signal through a mixing console, you will need to check the **Thru** option in order to hear the signal you're recording. When you check the **Thru** option, Studio Vision sends the audio signal arriving at the input directly to the output of an audio channel. If you're using a mixing console, use it to route the audio signals and leave the **Thru** option unchecked.

❑ Designate a Record File

To record audio, you must first designate where to store it on your hard disk. You can't just record audio and decide later where to put it.

You can set up record files in a couple of different ways:

- you can record all audio pertaining to a particular sequence to one record file (either mono or stereo-interleaved). This method keeps all audio information together in one place, making it easy to find and backup audio performances.
- you can record each audio event (or "take") into a separate record file. This method keeps different takes in different files so, if you lose or damage a file, you lose only one audio event and not the audio for the entire sequence. This method is also useful when you want to import snippets of audio into sample editing programs.

The method you choose affects only how audio is stored on your hard disk—it does not affect playback.

Recording into Record Files

When you choose the file you want to record to, as long as that file is displayed in the Record Monitor window as the designated record file, all audio you record on that channel will go into that file. Even if you stop recording then begin again, all subsequently recorded audio will be appended to existing audio in that record file.

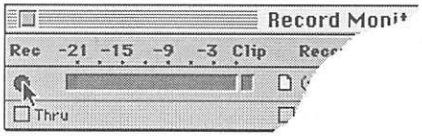
NOTE: If you are recording successive takes into one file, you can save disk space by using **Undo** after an unsatisfactory take—when you do so, Studio Vision records over the previously recorded take.

If you want each take you record to be a separate recording contained in a separate file, you need to designate a new record file every time you record a take.

Designating the Record File

To initially designate a record file:

1. **Click the Record Enable Indicator next to the appropriate input channel.**



   Studio Vision opens a standard Macintosh Save As dialog box.

2. **Type a name for your new record file in the Save As dialog box, or use the name Studio Vision suggests.**

   If your system includes multiple hard disks, be sure to select the drive you want to store the file on.

3. **Click the Save button.**

   The name of your record file is displayed in the "Record File" column, the Record Enable Indicator is lit (indicating recording on that input is enabled), and the amount of available recording time is displayed in the "Available" column (as determined by the amount of free space on your hard disk).

   In the future, anything you record on this input will automatically go into the file named here.

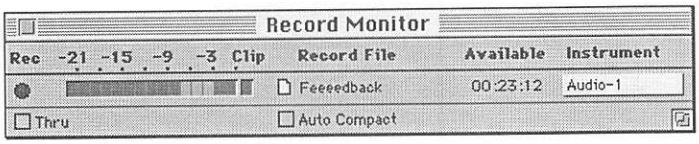


Figure 6.3: Record Monitor Window for 1-Input System

If you assign a Record File to an input and decide to record MIDI but not audio, simply disable audio recording by clicking the Record Enable Indicator again to turn it off. Once you've assigned a Record File to an input channel, you can toggle its Record Enable on and off as desired—you won't be prompted by the Save As dialog box. That dialog box appears only if you haven't assigned a Record File to the input channel.

NOTE: Studio Vision, when used with Sound Manager, records all audio files in AIFF format.

Record Enabling Audio Inputs for a Mono Track

Studio Vision, when used with Sound Manager, can record either a single mono file or a single interleaved stereo file (if your hardware contains two inputs). To record a mono track, simply enable an input channel by clicking its Record Enable Indicator as discussed in the previous section.

Record Enabling Audio Inputs for Stereo Recording

NOTE: Your audio hardware or Macintosh must have at least two input channels in order to record stereo files.

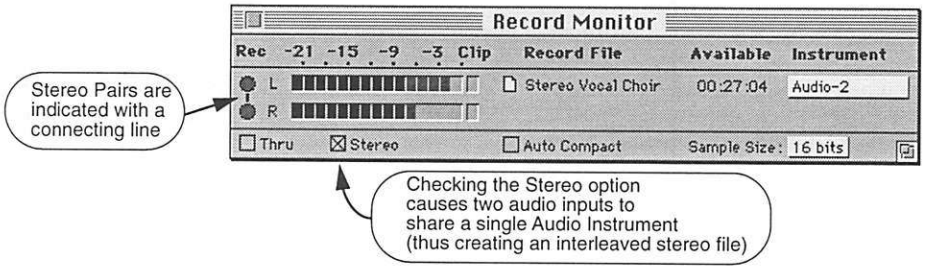
To record a stereo track:

1. **Click the Stereo option to check it.**

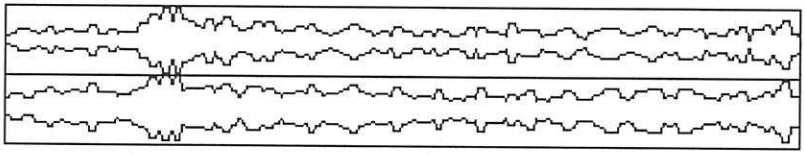
   This causes input pairs that you record to be recorded as a single, interleaved stereo audio event.

2. **Enable the two connected input channels by clicking their Record Enable Indicators.**

   The Record Monitor window indicates stereo pairs by connecting them with a straight line.



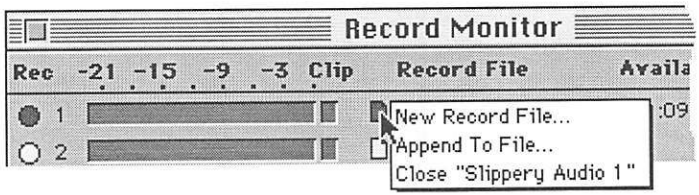
When you record in stereo, both channels appear as a single audio event, but with unique left and right waveforms.



Designating Separate Files for Different "Takes"

If, after recording an audio track, you want to use the same input to record a different "take" (or audio event) that uses a different record file, you need to designate a new file for the audio to go into. To do so:

1. **Press and hold the mouse on the Record File options icon.**
   Studio Vision opens a pop-up menu of Record File options.



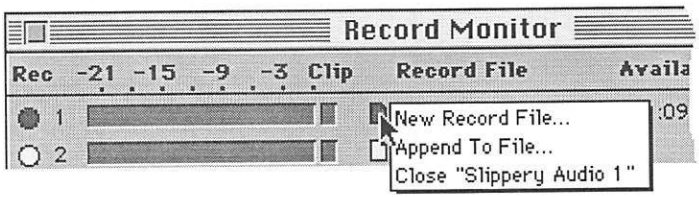
2. **Select New Record File from the pop-up menu.**
   Studio Vision opens a standard Save As dialog box.
3. **Use the dialog box to name a new record file, then click the Save button.**
   Studio Vision creates a new record file and calculates the available recording time based on the amount of disk space available.
4. **Make sure the input is record enabled.**

Releasing a Record File From Use as the Designated Record File

You can't perform certain operations on a file when it is the designated record file. For instance, you can't delete it or remove it from the file list (as discussed in "Chapter 20: File Management").

To release a file from use as the record file:

1. **Press and hold the mouse on the Record File options icon.**
   Studio Vision opens a pop-up menu of Record File options.



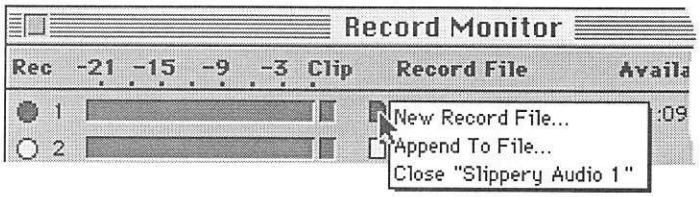
2. **Select Close "<file name>" from the pop-up menu.**
   Studio Vision releases the record file and shows the name of the input's record file as "(none)." If desired, you can now designate a new record file by selecting **New Record File** from the pop-up Record File options menu.

The released file is still stored on your hard disk and, if you have audio events in your current sequence that reference data in the file, it will still be listed in the File Management dialog box. For more information about file management, see "Chapter 20: File Management".

Appending Audio to Files

If you release a record file from use or change the designated record file and decide later that you want to record more audio into a file you already recorded to, you can append the new audio to existing audio in a record file. To do so:

1. **Press and hold the mouse on the Record File options icon.**
   Studio Vision opens a pop-up menu of Record File options.



2. **Select Append to File from the pop-up menu.**
   Studio Vision opens the Append to File dialog box, which is basically a standard Macintosh Open dialog box.

NOTE: Some programs store non-audio information (such as Sound Designer markers) after the audio data in a file. Studio Vision will not append audio to a file that has non-audio information after the actual audio data.

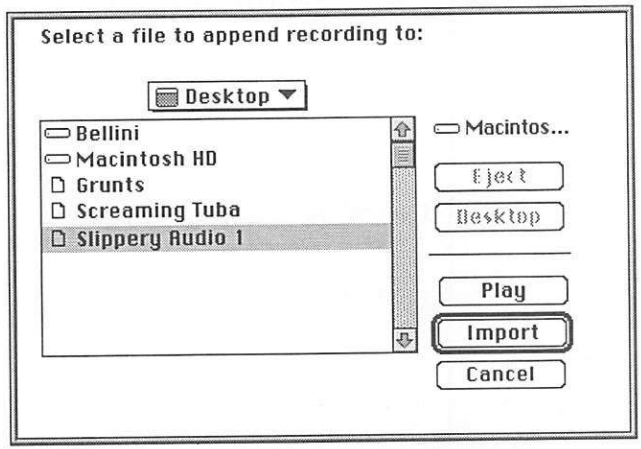
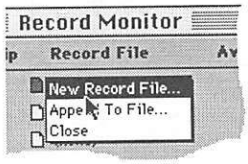


Figure 6.4: Append to File Dialog Box for Sound Manager

3. **Using the scrolling list, find the file onto which you want to append the new audio, then click it to select it.**
4. **Click the Import button to open the selected record file.**
   Studio Vision will now append any newly recorded audio to the selected file.

Alternately, you can open the Append to File dialog box as follows:

1. **Press and hold the mouse on the Record File options icon and select New Record File from the pop-up menu.**



Studio Vision opens the Save As dialog box.

2. **Click the Append to File button.**

Studio Vision opens the Append to File dialog box.

NOTE: The **Play** button in the Append to File dialog box is enabled only for AIFF files. Click the **Play** button to preview AIFF audio from the beginning of the file. The button becomes a **Stop** button as the file plays. Click the **Stop** button to stop playback of an AIFF file

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Auto Compacting a File

Compacting is a process that frees disk space. It retains audio that events in the current sequence file point to, and throws away audio that the current sequence file doesn't point to. Remaining audio moves together, and the space freed up becomes accessible to future recordings.

If you check the Auto Compact option in the Record Monitor window, Studio Vision compacts the current record file, if necessary, at the end of each record take. It's the same as if you opened the File Management dialog box and used its **Compact** command (as discussed in "Compact" on page 199).

If you compact your record file, and you've named your sequence file, compacting will resave your sequence file. This ensures that the files remain consistent. Therefore, don't compact if you don't want your sequence file saved—saving the file means you cannot revert later.

Keep in mind that you can always undo record, even after your record file has been compacted (unless you use the **Clear Clip and Undo** command discussed in "Clear Clip and Undo" on page 206).

Choose an Audio Instrument

You assign audio events to Audio Instruments in the same way you assign MIDI tracks to Instruments. Audio Instruments let you use volume and pan to control the playback of the audio event. They also let you view, edit, and playback multiple audio events in a single track—each Audio Instrument appears in its own row in a Graphic window.

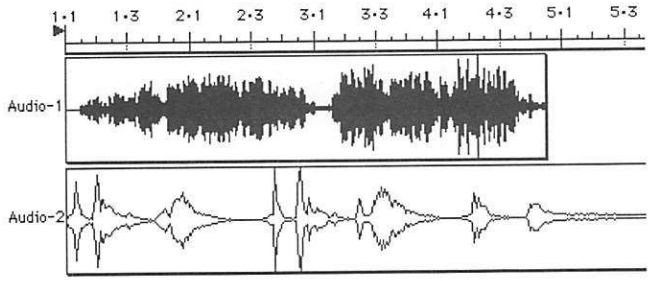
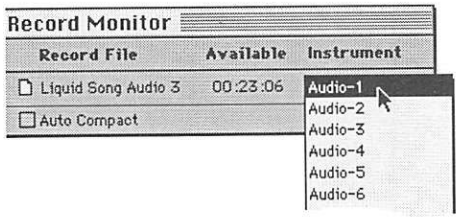


Figure 6.5: Audio Instruments Assigned to Audio Events

If you record multiple events into the same record file, each successive take will be appended onto the last. All events in the file will be on the same Instrument unless you choose a different Audio Instrument before each take.

You assign Audio Instruments to audio events by selecting an Audio Instrument in the Record Monitor window's Instruments column. To do so:

1. **Press and hold the mouse in the desired input's Instruments column.**
   Studio Vision opens a pop-up menu of Audio Instruments.



2. **While still holding the mouse button, drag the cursor over the desired audio instrument to select it (highlighting it).**
3. **Release the mouse button.**
   Studio Vision will assign the audio event that you record to the selected Audio Instrument.

After you record audio you can change the Audio Instrument assigned to the audio event in the file, or, if there are multiple recordings in the file, you can assign different Audio Instruments to specific audio events in the file. For instance, you might want all chorus takes assigned to one Instrument and all percussion takes assigned to another so that you can mix both types of audio independently.

You can reassign an event to a particular Audio Instrument by selecting it in an edit window and choosing **Do>Set Instrument**. Audio Instruments are discussed in detail in "Chapter 15: Working with Audio Instruments".

❑ Record a Track

Now that you've set a record level and designated one or more files into which you want to record the audio, you're ready to record a track.

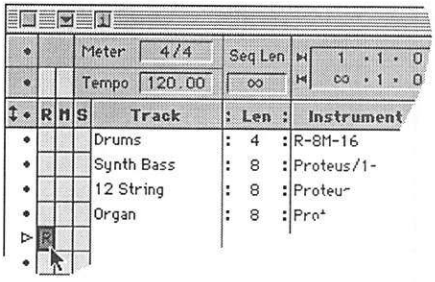
IMPORTANT: Before you begin recording audio, if you have any MIDI in your sequence, make sure you're satisfied with the sequence's tempo. Once you record audio, changing the tempo of the sequence changes the way the MIDI and audio line up with each other causing them to be out of sync.

To record an audio track:

1. **Leave the Record Monitor window open.**

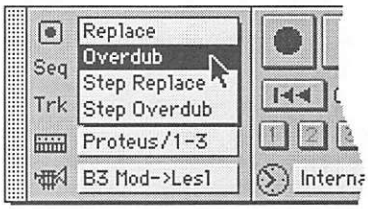
   The Record Monitor window must be open in order to record audio into Studio Vision.

2. **In the Tracks window, click the "R" column to record enable a track (just as you do when you record MIDI).**

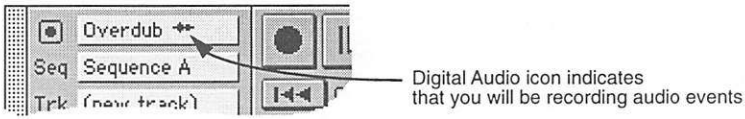


3. **If desired, type a new track name.**

4. **Select the desired record mode from the Record Mode pop-up menu (in the Control Bar).**



If you are about to record an audio event, the record mode display contains a small digital audio icon.



5. **In the Control Bar, either set a Countoff or select Wait for Note.**
6. **Click the Record button in Studio Vision's Control bar.**
7. **If you chose Wait for Note, either play a MIDI note, click the Play button, or press the Spacebar to start recording.**
8. **Play or sing into your digital audio input device. Studio Vision will also record any MIDI you perform.**
9. **Click the Stop button when you want to stop recording.**

The audio you record will be recorded into the current record file (or files) listed in the Record Monitor window. Remember, if you want to record into another file, you need to first designate it as the record file.

If you have the Graphic window open you'll see a graphic representation of your waveform appear below the Piano Roll.

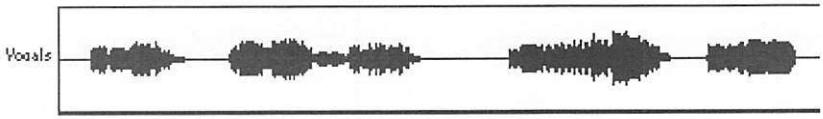


Figure 6.6: Waveform Displayed

The appearance of the waveform is determined by whichever option is selected in the **Audio>Waveform Display** submenu. Specifically:

- **Off**: This display option completely disables the waveform display. When you select this option, Studio Vision displays waveforms as a straight line and wastes no time calculating their appearance.
- **Fast**: This display option allows Studio Vision to redraw waveform displays quickly because it draws them at a low resolution. This may be desirable when you're recording or playing back audio, but the lower resolution is not as good for detailed audio editing.
- **High Resolution**: This display option allows Studio Vision to display the actual texture of waveforms. This is desirable when you're editing and need to clearly see all peaks and valleys, but it takes the longest amount of time to recalculate and draw.

See "Waveform Display" on page 251 for more information.

NOTE: Remember, if you want to turn audio recording off so you can record only MIDI, uncheck the Record boxes in the Record Monitor window or simply close the window. You can see if audio recording is enabled by looking for the little digital audio waveform in the Record Mode display.

❑ Save the Sequence

Save your sequence file when you're done recording audio events. To do so:

1. **Choose File>Save.**

   Studio Vision will save the file.

   If you haven't yet named the sequence file, Studio Vision opens a standard Macintosh Save As dialog box. Use the dialog box to name and save the sequence file.

Studio Vision saves all your audio events with the current sequence file. The next time you open the sequence file, Studio Vision will locate the digital audio files referenced by that sequence file, and will alert you if any are missing.

Locating Missing Audio Files

If you change the name of an audio file, delete it, or move it onto a different disk or into a different folder, Studio Vision won't be able to locate the audio data necessary to play back the sequence. When you attempt to open a sequence that references this file, you'll be prompted by a dialog box (which is the same as the Import dialog box) to locate the missing file.

NOTE: You can audition files from this dialog box to make sure you are selecting the correct one. Just select the file by clicking on it and click the **Play** button.

If you can't locate the file and want to open the sequence regardless, click **Cancel**. All data except that file will open in the sequence.

TIP: If there is more than one audio file missing and you wish to avoid locating all of them, hold down the Option key when you click **Cancel** in the first dialog box.

CHAPTER 7: Importing Audio Files with Sound Manager

This chapter discusses how to import audio into Studio Vision when using Apple's Sound Manager. If you're using Studio Vision with DAE, read "Chapter 12: Importing Audio Files with DAE".

❑ Import Basics

You can import audio files from various sources that use any of the following file formats:

- Sound Designer II
- AIFF

To import Audio Files into Studio Vision:

1. **Open a Graphic or List window and set an input edit point.**
   Alternately, you could click in the Track Overview portion of the Tracks window to set an input edit point.
2. **Choose Audio>Import Audio.**
   Studio Vision opens the Import Audio dialog box.

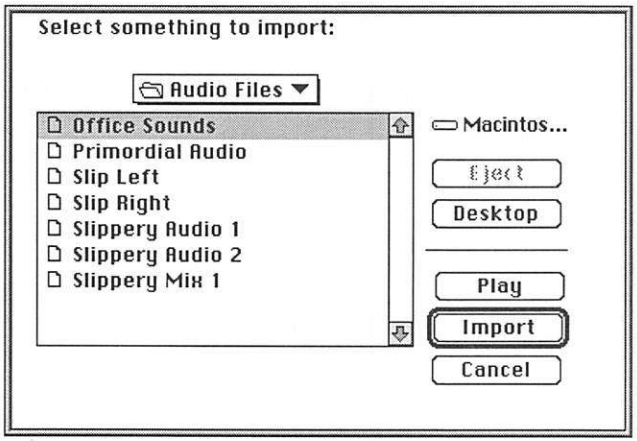
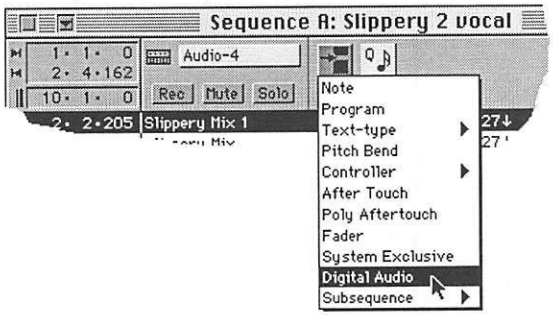


Figure 7.1: Import Audio Dialog Box for Apple Sound Manager

You can import both AIFF and SD II files, but the **Play** button is enabled only for AIFF files. Click the **Play** button to preview AIFF audio from the beginning of the file. The button becomes a **Stop** button as the file plays. Click the **Stop** button to stop playback of an AIFF file.

In a List window, there's an additional way to open the Import Audio dialog box:

1. **Set an input edit point in the List window.**
2. **Press and hold the Insert Events button.**
   Studio Vision opens a pop-up menu.



3. **Select Digital Audio from the pop-up menu.**
   Studio Vision opens the Import Audio dialog box.

CHAPTER 8: Syncing to SMPTE with Sound Manager

This chapter discusses how to use Studio Vision and Sound Manager to synchronize audio playback with an external SMPTE source. If you're using Studio Vision with DAE-compatible hardware, read "Chapter 13: Syncing to SMPTE with DAE" in place of this chapter.

❑ Sync Modes

As discussed in the Vision Reference manual, Studio Vision offers four sync options:

- **Internal Clock:** Use this to sync MIDI and/or digital audio to the Macintosh's internal clock. **Internal Clock** does not sync data to SMPTE.
- **External Beat Clock:** Use this to sync MIDI only (not audio) to an external clock source that sends 24 pulses per quarter note. Beat clocks are tempo dependent; they are not real time. **External Beat Clock** is used primarily for syncing to a drum machine, a sequencer, or another computer.
- **MIDI Time Code**: Use this to sync MIDI, digital audio, or both data types simultaneously to an external SMPTE clock source (such as an audio tape, a video deck, or a synchronizer).

- **MTC/Machine Control**: If you have a tape machine that supports MIDI Machine Control, and you've installed the AV-OMS driver in the OMS folder in your System folder, you can use Studio Vision to control the machine. Detailed instructions for using MIDI Machine Control are in your Vision Reference manual.

  The MTC/Machine Control option will not appear unless you've installed the AV-OMS driver in the OMS folder in your System folder.

All the previously mentioned sync options are available either from the **Options** menu's **Receive Sync Mode** submenu or from the Control Bar's Master Sync Mode pop-up menu.

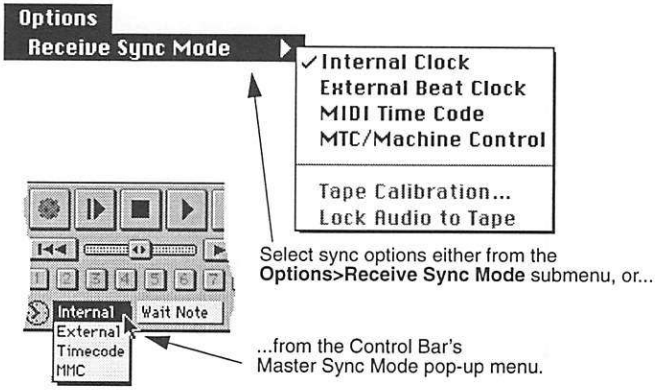


Figure 8.1: Receive Sync Modes in the Options Menu

❑ Syncing Audio to SMPTE with Sound Manager

When using Sound Manager, Studio Vision does not compensate for varying tape speeds during SMPTE synchronization. It always plays at the Session Sample Rate.

Therefore, audio events will start at the correct SMPTE times but the sound will drift out of sync if the tape speed starts to deviate from its nominal speed.

When using Sound Manager, the best way to sync digital audio to tape is to either record short audio events or break existing audio events up into smaller pieces. This minimizes any timing discrepancies that may occur when playing back digital audio that's synchronized to tape.

NOTE TO PERFORMA 600 OWNERS: Due to MIDI overrun errors, it is not possible to use SMPTE synchronization and Sound Manager audio on the Performa 600.

NOTE: Because Sound Manager can only play back audio files at the session sample rate, both the **Lock Audio to Tape** and **Tape Calibration** options in the **Receive Sync Mode** submenu are disabled.

PART 3: Setting Up, Recording, and Syncing with DAE

CHAPTER 9: Overview of DAE Procedures

Studio Vision can work with either DAE or Sound Manager. Both DAE and Sound Manager are digital audio systems that Studio Vision uses to record and play digital audio. Studio Vision uses either DAE or Sound Manager to control digital audio in much the same way that it uses OMS to control MIDI communications.

This chapter discusses how to set up Studio Vision for use with DAE. If you wish to use Studio Vision with Apple's Sound Manager, refer to "Part 2: Setting Up, Recording, and Syncing with Sound Manager".

See Table 1 on page 8 to determine whether you want to use Sound Manager or DAE.

NOTE TO DIGIDESIGN USERS: Opcode recommends that you use DAE (instead of Sound Manager) with your Digidesign audio hardware. DAE offers many features and benefits not possible with Sound Manager.

❑ About the Digidesign Audio Engine (DAE)

DAE stands for Digidesign Audio Engine. DAE was created by Digidesign and provides a method for playing and recording multiple tracks of digital audio with Digidesign sound cards (such as Audiomedia, Sound Tools, and Pro Tools). Studio Vision controls DAE, and DAE in turn controls the audio.

Some Macintosh models are incompatible: The Digidesign Audio Engine does not work with some sound card/Macintosh model combinations. For specific information on the incompatible combinations, see the Read Me files included with Studio Vision (there may also be a compatibility chart included with your documentation).

When you install Studio Vision, the DAE Folder is automatically installed in your system folder. Whenever you launch Studio Vision, the DAE application will automatically launch. Whenever you quit Studio Vision, DAE will also quit unless it's being used by some other application.

Using DAE is automatic and transparent. But it is important to realize that it is there, running "behind the scenes" to control the digital audio signals.

System Requirements for Studio Vision with DAE

To run Studio Vision with DAE, you must meet the following computer requirements:

- A compatible Macintosh (see the DAE/Macintosh compatibility chart included with Studio Vision).
- At least 8 Megabytes of RAM.
  —Studio Vision requires 3.5 megabytes.
  —DAE requires a minimum of 2.5 megabytes.
  —Your System software requires at least 2 megabytes.
- A DAE-compatible digital audio card.
- A hard disk that's fast enough to record and play back digital audio (see the hard disk compatibility chart included with Studio Vision), and is reasonably defragmented (defragmenting software is encouraged).
- Macintosh System 7.0 or higher.
- OMS.
- 32-bit memory addressing needs to be on.
- The DigiSystem INIT (version 2.5 or higher) must be in the Extensions folder (in the System Folder).
- The DAE application (version 1.08 or higher) must be in the DAE Folder (in the System Folder).
- For more than four tracks with Pro Tools, you'll also need the A/ROSE and the ProTools SysAxe 2.0 extensions (provided).

❑ Power User Overview

This section provides quick step-by-step instructions on how to set up and record digital audio using DAE. Confident users may find this is all the instruction they need. If you need more information, additional details about each step are discussed in later chapters.

STEP 1: Set up your audio recording hardware (See "Chapter 10: Hardware Setup with DAE" for details):

1. **Make sure you've properly connected your digital audio hardware, microphones, etc.**
2. **Choose Audio>Hardware Setup to tell Studio Vision about the audio hardware you're using.**
3. **Choose Audio>Buffer Size to tell Studio Vision how much RAM you want reserved for the digital audio buffer.**
4. **Choose Audio>Sample Rate to tell Studio Vision what sampling rate you want to use for recording audio.**

   For optimum audio performance, the session sample rate should match the hardware sample rate.

STEP 2: Set record levels (See "Set Record Levels" on page 79 for details):

1. **Choose Windows>Record Monitor to set your audio input levels.**
2. **Decide whether or not you need to use the Audio Thru option.**

   When this option is checked, Studio Vision sends the audio signal arriving at the input directly to the output of an audio channel so that you can hear the signal you're recording. Generally, you'll use Thru when you bypass a mixing console. Otherwise, audio routing is handled by your console.
3. **Watch the volume input level display and adjust your signal source as appropriate.**

STEP 3: Designate a record file (See "Designate a Record File" on page 85 for details):

1. **Record enable an input channel by clicking its Record Enable Indicator in the Record Monitor window.**
2. **Studio Vision opens a standard Macintosh Save As dialog box.**
3. **Designate the file that will be used to store the audio you record. Do this by either typing a new file name, or selecting an existing file from the scrolling list.**

   Use the dialog box's **Append to File** button if you want to add what you record to the contents of an existing file.
4. **If you're recording in stereo, select the Link Pairs option.**

5. **Determine whether or not you need to use the Auto Compact option.**

   This option causes Studio Vision to automatically compact files when you record them.

6. **Select which Audio Instrument will play back the audio event you record.**

STEP 4: Record a track (See "Record a Track" on page 94 for details):

1. **Record enable a track by clicking in the Tracks window Record column.**
2. **Select a Record mode from the Control Bar.**
3. **In the Control Bar, select either Countoff or Wait for Note mode.**

   If you choose Wait for Note, you'll have to press the Spacebar to start the Counter if you're not also recording MIDI notes.

4. **Click the Record button and begin to play or sing into your digital audio hardware.**
5. **When you're finished, click the Stop button.**

   Studio Vision records audio and displays it in a graphic window using the selected **Audio>Display Waveform** option.

STEP 5: Save the sequence (See "Save the Sequence" on page 97 for details):

1. **Choose File>Save.**

   Studio Vision saves all your audio events with the current sequence file. The next time you open the sequence file, Studio Vision will locate the necessary digital audio files and play them back.

CHAPTER 10: Hardware Setup with DAE

This chapter discusses how to set up Studio Vision to work with your DAE-compatible audio hardware. If you're using Studio Vision with Sound Manager, read "Chapter 5: Hardware Setup with Sound Manager" in place of this chapter.

❑ Set Studio Vision to DAE Mode

To use Studio Vision with DAE, select **Audio>Audio System>DAE** to place a check mark next to the option.

❑ Allocate RAM

Unlike most Macintosh applications, Studio Vision requires two separate RAM allocations:

- **Application RAM**: This is the amount of RAM required to run the Studio Vision application.
- **RAM Buffer**: This is the amount of RAM required to temporarily store digital audio while recording or playing.

The following sections discuss how to allocate RAM to both areas.

Allocating Application RAM to Studio Vision

Allocate application RAM to Studio Vision using the standard Macintosh technique. Specifically:

1. **Click the Studio Vision application icon to select it.**
   Don't double-click it or you'll actually run the application.
2. **In the Finder, choose File>Get Info.**
   A standard Get Info window appears.
3. **In the Get Info window, allocate as much of your available memory as possible to Studio Vision.**
   Opcode recommends that you assign at least 3500K to Studio Vision.
4. **Click the close box to close the Get Info window.**

Allocating RAM to the Digital Audio RAM Buffer

In addition to the RAM required to run the Studio Vision application, you'll need to set aside more memory for use as a RAM buffer. DAE uses the RAM buffer to store digital audio temporarily before sending it to your hard disk, or before playing it.

IMPORTANT: Don't confuse the RAM buffer with the application RAM size. The RAM buffer determines the amount of RAM dedicated to temporarily storing digital audio—the application size determines the amount of memory dedicated to Studio Vision.

Determining the Best RAM Buffer Size

You can select one of four RAM buffer sizes:

- 1 (2216 K)
- 2 (2970 K)
- 3 (4478 K)
- 4 (7494 K)

If you have a slow hard disk, you should set the buffer size to the largest amount your system will allow. If you have a fast hard disk, you may want to use a smaller buffer.

When the RAM buffer is small, your Macintosh will need to access the hard disk frequently. If you do not have a fast hard disk, this may cause problems. The solution is to increase the RAM buffer size.

When the RAM buffer is large, your Macintosh will store more digital audio in RAM, and will not need to access your hard disk as often. However, you may notice that it takes longer to start and stop playing digital audio. This is because your Macintosh needs to fill the buffer with digital audio from your hard disk. If you have a large RAM buffer, this will take longer.

In general, you should set the RAM buffer to the largest size your system allows. If you notice a time drag, then try a smaller setting. If you get errors such as "Hard Disk Too Slow" or fragmented audio, increase the buffer size.

Setting the RAM Buffer

To set the RAM buffer:

1. **In Studio Vision, choose Audio>Buffer Size.**
   Studio Vision opens the Buffer Size dialog box.

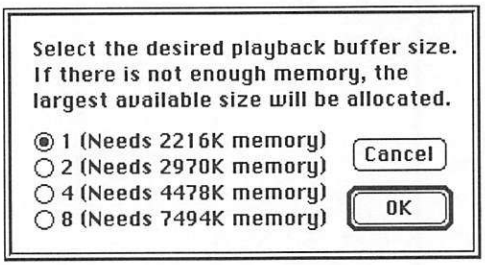


Figure 10.1: Buffer Size Dialog Box for DAE

2. **Select the largest RAM size that is appropriate for your system.**
   See "Determining the Best RAM Buffer Size" on page 70 to help you choose which setting is most appropriate.

NOTE: The numbers in this dialog box show the amount of memory used by the RAM buffer *only*. This does not include the amount of memory you need for Studio Vision or your system software.

---

3. **Click the OK button.**
   The selected amount of RAM is set aside for use as a digital audio RAM buffer.

❑ Set Up the Audio Hardware

Before you can record and play digital audio, you must tell DAE what digital audio hardware you're using. To do so:

1. **Choose Audio>Hardware Setup.**
   The Hardware Setup dialog box opens.

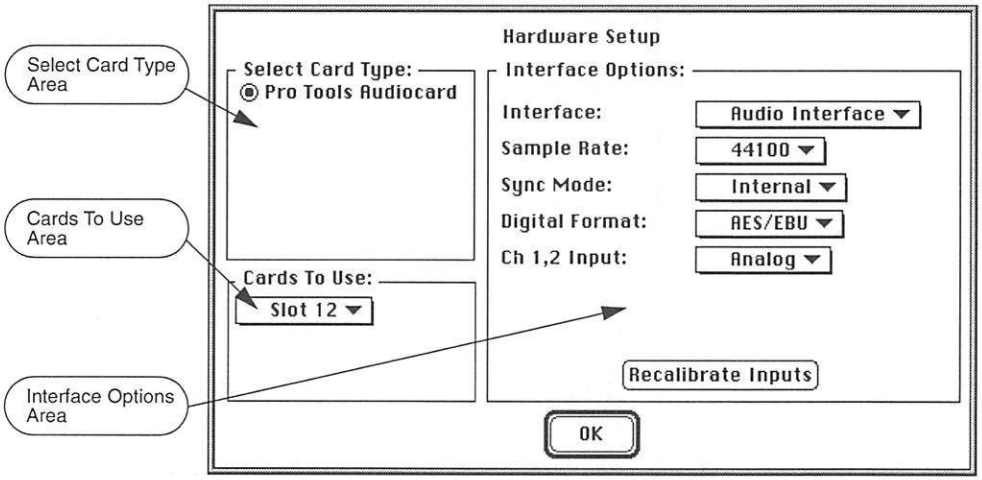


Figure 10.2: DAE Hardware Setup Dialog Box

USERS OF THE ORIGINAL SOUND TOOLS SYSTEM: The original Sound Tools was designed as a 2-channel digital audio system and Studio Vision treats it this way by default. If you want to experiment with trying to squeeze 4-channels out of an original Sound Tools system (at the risk of poor audio performance), you may do so by holding down the Option key when you choose **Audio>Hardware Setup**. This causes Studio Vision to treat Sound Tools as a 4 channel system. Studio Vision remembers this configuration until you choose **Audio>Hardware Setup** without holding down the Option key, or until you click the **Hardware Setup** button in either the Set Session Sample Rate dialog box or the Conversion Overview dialog box.

About the Hardware Setup Dialog Box

As shown in Figure 10.2, the Hardware Setup dialog box contains numerous elements. The following sections discuss each element in detail.

Select Card Type

This area is relevant only if you have more than one type of digital audio card installed. It lets you select the type of card you wish to use.

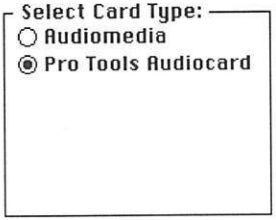


Figure 10.3: Typical Select Card Type Area of Hardware Setup Dialog Box

Use the radio buttons to tell DAE which audio card you wish to use. You can use only one type of audio card at a time.

If your Macintosh contains more than one type of DAE-supported digital audio card, there will be more than one available choice.

NOTE TO PRO TOOLS USERS: If you're using a System Accelerator card, it's represented in this section of the dialog box by a check box. If you have installed multiple Pro Tools cards, you'll need to check the System Accelerator check box if you want to record or play more than four tracks of simultaneous audio. In the rare case that you have only one Pro Tools audio card and a System Accelerator, you should still check the System Accelerator check box because you'll get much better performance due to the System Accelerator's dedicated SCSI port (though you will be able to record and play *only* from the disk connected to that SCSI port). See your Digidesign manuals for more details.

Cards To Use

If you have multiple cards of the type selected in the Select Card Type area, use this pop-up menu to select which of the cards you'll use.

This area is of particular use to those with multiple Pro Tools cards. Specifically:

- If you have multiple Pro Tools cards and no System Accelerator (or if the System Accelerator option is unchecked in the Select Card Type area), use this pop-up menu to select which Pro Tools card you'll use with Studio Vision. You cannot record and play back more than four tracks of audio unless you have the System Accelerator card and have enabled the option.
- If you have multiple Pro Tools cards, a System Accelerator, and have checked the System Accelerator option in the Select Card Type area, this pop-up menu will let you either select between cards, or select multiple cards. Selecting multiple cards increases the number of simultaneous channels supported by Studio Vision.

For more information about using Pro Tools with DAE, see your Digidesign manuals.

Interface Options

Use this area to inform DAE about the specifics of your audio hardware.

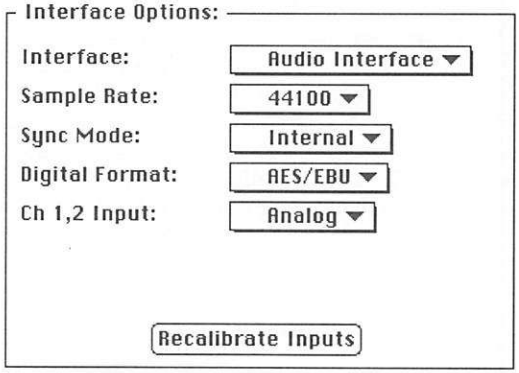


Figure 10.4: Track Mapping Section of Hardware Setup Dialog Box for Pro Tools

This area contains several options, including:

- **Interface** pop-up menu: Select the type of interface that's connected to your digital audio card.
- **Sample Rate** pop-up menu: Select the hardware sample rate.
- **Sync Mode** pop-up menu: From this pop-up menu, select **Digital** if you're syncing to a digital audio tape deck or other AES/EBU-based master clock source; otherwise, leave this setting on **Internal**.
- **Digital Format** pop-up menu: Select either **AES/EBU** or **S/PDIF** depending on which digital format you're using to transfer digital audio between your Macintosh and an external recorder.
- **Ch 1,2 Input** pop-up menu: Select whether the inputs into Channels 1 & 2 are **Analog** or **Digital**.

For more information about any of the parameters in the Hardware Setup dialog box, see your Digidesign manuals.

❑ Set a Session Sample Rate

Now that you've told Studio Vision about your audio hardware, you'll need to determine a session sample rate before you can record. This is the sample rate Studio Vision will use to record and playback all audio files referenced by the sequence file.

The term "sample rate" refers to the number of audio samples that comprise 1 second worth of audio. Higher session sample rates produce better audio fidelity, but use more disk space (because there are more sample points per second). You can save disk space by using a low sample rate, but this degrades the audio fidelity.

Hardware Sample Rate Vs. Session Sample Rate

It's important to recognize that there is a difference between the hardware sample rate (as discussed in "Interface Options" on page 74) and the session sample rate. Specifically:

- The **Hardware Sample Rate** is the sample rate that your hardware uses to play back audio files. Your audio hardware works at only one of a few preset sample rates. Most professional systems work at either 44100 Hz (CD-quality) or 48000 Hz. See your hardware manual to learn what sample rates it supports.
- The **Session Sample Rate** is the sample rate that is common to all audio files referenced by a sequence. In Studio Vision, all audio events in a sequence file must have the same sample rate.

To get the best audio quality, you should record all of your sound files at the same rate as your hardware sample rate. When you do this, the sample rates of your files will always match the hardware sample rate, and sample rate conversion will not be necessary. Sample rate conversion is discussed in "Chapter 21: Sample Rate Conversion and Deinterleaving".

Studio Vision, when used with DAE, will allow you to play sound files that are at a different sample rate than the Hardware Sample Rate. It does this by converting the audio file's sample rate "on-the-fly" to play at the Hardware Sample Rate. However, this degrades the audio fidelity somewhat. For now, simply set your session sample rate and your hardware sample rate to the same value for optimum audio performance.

To set a session sample rate:

1. **Choose Audio>Sample Rate.**
   Studio Vision opens the Set Session Sample Rate dialog box.

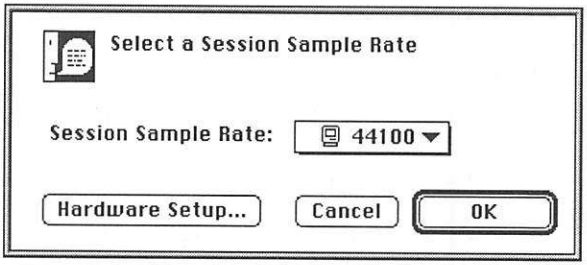


Figure 10.5: Set Session Sample Rate dialog box

2. **From the Session Sample Rate pop-up menu, select the desired session sample rate.**

   The hardware sample rate is indicated by a small Macintosh icon to its left. The other sample rates (if any) represent any unique sample rates of audio files referenced by the sequence file.

3. **If you wish to change the hardware sample rate, click the Hardware Setup button.**

   Studio Vision opens the Hardware Setup dialog box. Use it to set a new hardware sample rate as discussed in "Set Up the Audio Hardware" on page 72.

You can, if desired, set a session sample rate other than one of the ones listed in the pop-up menu. To do so, choose "Other" from the pop-up menu; Studio Vision opens the Set Other Rate dialog box.

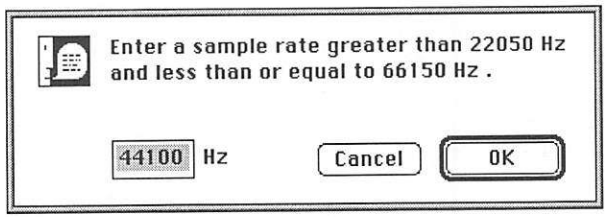


Figure 10.6: Set Other Rate Dialog Box

NOTE: DAE requires that the Session Sample Rate be greater than half and less than 1.5 times as big as the Hardware Sample Rate.

Automatic Sample Rate Setting for Existing Sequences

When you open an existing sequence, Studio Vision will automatically set both the session sample rate and the hardware sample rate if both of the following conditions are met:

- all audio files referenced by the sequence have the same sample rate

  AND

- this sample rate matches one of the available hardware sample rates

If both these conditions are met, Studio Vision automatically sets the session sample rate and hardware sample rate to match the sample rate of the audio file(s).

CHAPTER 11: Recording Audio with DAE

This chapter discusses how to record into Studio Vision with your DAE-compatible audio hardware. If you're using Studio Vision with Sound Manager, read "Chapter 6: Recording Audio with Sound Manager".

❑ Set Record Levels

This section discusses how to set recording levels.

Open the Record Monitor Window

To test the amplitude of your signal and set up Studio Vision to record audio:

1. **Choose Windows>Record Monitor.**
   Studio Vision opens the Record Monitor window.

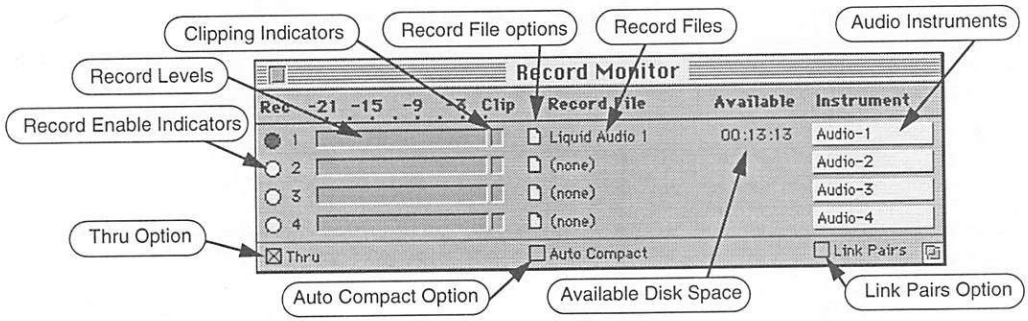


Figure 11.1: Record Monitor Window for Pro Tools & Sound Tools II

TIP: You can also open the Record Monitor window directly from the Control Bar by double clicking the Record Indicator icon (▣).

The appearance of the Record Monitor window changes depending on the type of hardware you're using. Figure 11.1 shows a Record Monitor window for a 4-track Pro Tools system. Other hardware configurations are discussed later.

IMPORTANT: The Record Monitor window must remain open in order to record audio.

About the Record Monitor Window

As shown in Figure 11.1, there are numerous elements in the Record Monitor Window. Among these are:

- **Record Levels**: Use this area to view the audio input level when recording audio.
- **Clipping Indicators**: This indicator lights when an audio level exceeds 0 dB and stays lit until you reset it by clicking anywhere within the Record Level indicator for the offending channel.
- **Record Enable Indicators**: Click a Record Enable Indicator to record the audio arriving at the corresponding input. When an input channel is record-enabled this indicator is solid red. The indicator flashes red if Studio Vision is in play mode, and has the possibility of recording (such as with punch-in)—it then turns solid red when Studio Vision begins to actually record.
- **Record File Options**: Press and hold this icon to open a pop-up menu of record file options. These options let you create new record files, append to existing files, or close a record file.
- **Record Files**: This column shows the name of the file to which audio data is recorded.

- **Audio Instruments**: Use this column to select an Audio Instrument for each channel (or linked pair). Use Audio Instruments to group related audio events, to associate controller data with specific events, to assign different audio channels to particular events so that multiple events in the same track can sound simultaneously, and to associate events with particular outputs.
- **Thru** Option: Check this option if the signal you're recording is patched directly into your audio hardware without first going through a mixing console. When this option is checked, Studio Vision sends the audio signal arriving at the input directly to the output of an audio channel so that you can hear the signal you're recording. If you're using a mixing console, use it to route audio signals and leave this option unchecked.
- **Auto Compact** Option: Choose this option to automatically compact audio during recording. Compacting frees disk space by throwing out audio data that is not referenced by the current sequence file (such as data from discarded "takes").
- **Link Pairs**: Choose this option to link two channels together into a single stereo audio event.

Record Monitor Window for the Original Audiomedia Card

Figure 11.2: Record Monitor Window for Original Audiomedia Card

If you're using an original Audiomedia card (not Audiomedia II or Audiomedia LC), the Record Monitor window contains these additional elements:

- **Level** numerical: Since the Audiomedia card has no knobs for adjusting input levels, you can use this numerical to adjust the input volume within a range of 0 to 7.
- **Mic** option: When you check this option, Studio Vision uses the microphone input on the Audiomedia card. If it is unchecked, Studio Vision uses the line inputs.

Also, you can record only two channels simultaneously using an Audiomedia card (though you can play back up to four channels simultaneously). For this reason, the Record Monitor window shows only two input channels.

Record Monitor Window for Audiomedia II or Audiomedia LC

Figure 11.3: Record Monitor Window for Audiomedia II Card

If you're using an Audiomedia II or Audiomedia LC card, the Record Monitor window contains an additional **Level** numerical. Since the Audiomedia card has no knobs for adjusting input levels, you can use this numerical to adjust the input volume within a range of 0 to 7.

Also, you can record only two channels simultaneously using an Audiomedia card (though you can play back up to four channels simultaneously). For this reason, the Record Monitor window shows only two input channels.

Record Monitor Window for the Original Sound Tools

The Record Monitor window for the original Sound Tools system is the same as Figure 11.1 on page 79, except that it contains only two input channels.

Figure 11.4: Record Monitor Window for Original Sound Tools System

Record Monitor Window for Pro Tools with Eight or More Channels

The Record Monitor window for multiple Pro Tools cards (when used with the System Accelerator card) is the same as Figure 11.1 on page 79, except that it contains the same number of input channels as your system supports. For example, if you have 2 Pro Tools cards, you'll see 8 input channels; 3 cards will result in 12 input channels; and 4 cards yields 16 input channels.

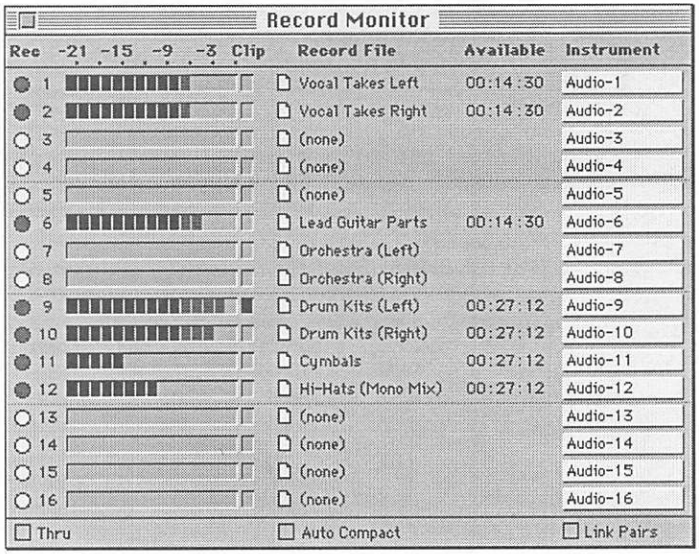


Figure 11.5: Record Monitor Window for 16 Channel Pro Tools System

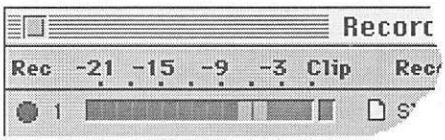
Optimizing An Input Level

The Record Level portion of the Record Monitor window functions like an LED display. Whether you're recording or not, the amplitude level of the incoming signal causes the level indicator to move, showing you the amplitude graphically and in decibels.

You'll obtain the best signal-to-noise ratio by adjusting the peak amplitude to between -3 and 0 decibels (0 is the last dot before clipping). Zero decibels is equal to the maximum volume of 16 bit resolution. Decibel numbers represent the number of decibels below maximum volume.

Before you record enable a track, you should adjust your audio input level by watching the level indicator. To do so:

1. **Speak into your microphone or send whatever your signal may be.**
2. **Watch the level indicator move.**



3. **Adjust the level you're sending, keeping the amplitude peaks above -3 dB but below clipping.**

   If you're using a color monitor, you'll notice the bar is green within a low amplitude, yellow in the -3 to 0 range (the best range), and red when the signal is too loud and it clips.

   Generally, you'll adjust the input level on your mixing console. If you're using an Audiomedia card, the Record Monitor window has an additional input level control that you can also use.

Avoiding Clipping

If the amplitude of the audio signal exceeds the dynamic range of 16 bit audio, the waveform peaks become chopped off and flat (like a square wave), and the audio will sound buzzy and distorted. This is called "clipping," which you will most always want to avoid. If you're accustomed to analog recording, you'll soon notice that digital clipping is harsher and much less tolerable than analog clipping.

If you clip the volume so the amplitude exceeds 0 dB, the Record Monitor's clipping indicator lights at that moment. After the level recedes, the clipping indicator remains lit to remind you that you clipped the input level and you should go back and adjust it. When you're ready to try a different input level, you can clear the clip light by clicking anywhere in the record level indicator.

Monitoring the Input

If you're recording directly into your audio hardware without running the signal through a mixing console, you will need to check the **Thru** option in order to hear the signal you're recording. When you check the **Thru** option, Studio Vision sends the audio signal arriving at the input directly to the output of an audio channel. If you're using a mixing console, use it to route the audio signals and leave the **Thru** option unchecked.

❑ Designate a Record File

To record audio, you must first designate where to store it on your hard disk. You can't just record audio and decide later where to put it.

You can set up record files in a couple of different ways:

- you can record all audio pertaining to a particular audio instrument in a sequence to one record file (two for stereo). This method keeps all audio information together in one place, making it easy to find and backup audio performances.
- you can record each audio event (or "take") into a separate record file. This method keeps different takes in different files so, if you lose or damage a file, you lose only one audio event and not the audio for the entire sequence. This method is also useful when you want to import snippets of audio into sample editing programs.

The method you choose affects only how audio is stored on your hard disk—it does not affect playback.

Recording into Record Files

When you choose the file you want to record to, as long as that file is displayed in the Record Monitor window as the designated record file, all audio you record on that channel will go into that file. Even if you stop recording then begin again, all subsequently recorded audio will be appended to existing audio in that record file.

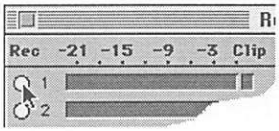
NOTE: If you are recording successive takes into one file, you can save disk space by using **Undo** after an unsatisfactory take—when you do so, Studio Vision records over the previously recorded take.

If you want each take you record to be a separate recording contained in a separate file, you need to designate a new record file every time you record a take.

Designating the Record File

To initially designate a record file:

1. **Click the Record Enable Indicator next to the appropriate input channel.**



Studio Vision opens a standard Macintosh Save As dialog box.

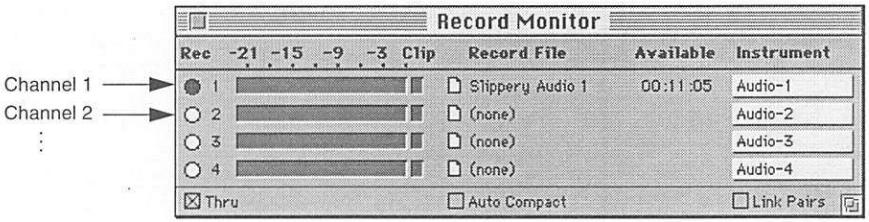
2. **Type a name for your new record file in the Save As dialog box, or use the name Studio Vision suggests.**

   If your system includes multiple hard disks, be sure to select the drive you want to store the file on.

3. **Click the Save button.**

   The name of your record file is displayed in the "Record File" column, the Record Enable Indicator is lit (indicating recording on that input is enabled), and the amount of available recording time is displayed in the "Available" column (as determined by the amount of free space on your hard disk).

   In the future, anything you record on this input will automatically go into the file named here.



4. **If you are going to be recording stereo, designate a different file for the other channel. If you're recording multiple audio channels, record enable each channel and designate a Record File for each.**

   This is discussed further in the following section.

If you assign a Record File to an input and decide to record MIDI but not audio, simply disable audio recording by clicking the Record Enable Indicator again to turn it off. Once you've assigned a Record File to an input channel, you can toggle its Record Enable on and off as desired—you won't be prompted by the Save As dialog box. That dialog box appears only if you haven't assigned a Record File to the input channel.

NOTE: Studio Vision, when used with DAE, records audio files in Sound Designer II format.

Record Enabling Audio Inputs for a Mono Track

Studio Vision can record either mono or stereo tracks. To record a mono track, simply enable an input channel by clicking its Record Enable Indicator as discussed in the previous section.

Record Enabling Audio Inputs for Stereo Recording

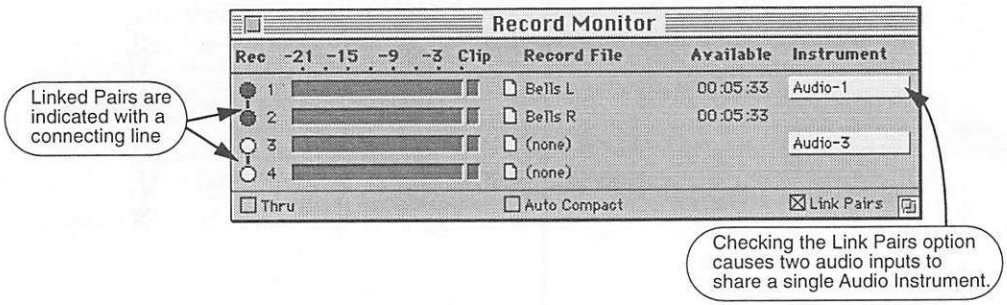
To record a stereo track:

1. **Click the Link Pairs option to check it.**

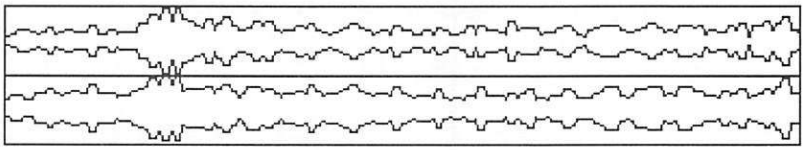
   In order to create a stereo event with DAE, Studio Vision must create two mono audio files and link them together into one event. This new audio event is called a "stereo linked event." Any future editing affects both halves of the linked event simultaneously.

2. **Enable two linked input channels by clicking their Record Enable Indicators.**

   The Record Monitor window indicates linked pairs by connecting them with a straight line.



When you record linked pairs, they appear as a single audio event, but with unique left and right waveforms.



If you later decide to unlink events that you recorded with the Link Pairs option enabled, you can do so by selecting them and choosing **Audio>Unlink Events**. For more information, see "Unlink Events" on page 245.

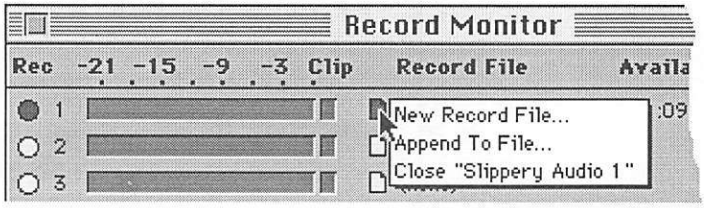
Record Enabling Audio Inputs for Multitrack Recording

You can record as many simultaneous tracks as your hardware allows. For example, if you have a four track recording system, you can record up to four mono tracks simultaneously, or two stereo tracks (equalling four channels). Each simultaneously recorded input must have its own record file. In addition, you should assign a different Audio Instruments to each input or linked input pair (as discussed in "Choose an Audio Instrument" on page 93).

Designating Separate Files for Different "Takes"

If, after recording an audio track, you want to use the same input to record a different "take" (or audio event) that uses a different record file, you need to designate a new file for the audio to go into. To do so:

1. **Press and hold the mouse on the Record File options icon.**
   Studio Vision opens a pop-up menu of Record File options.



2. **Select New Record File from the pop-up menu.**
   Studio Vision opens a standard Save As dialog box.

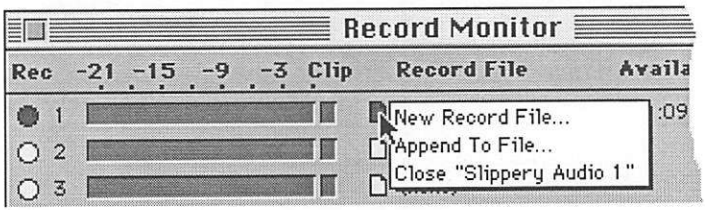
3. **Use the dialog box to name a new record file, then click the Save button.**
   Studio Vision creates a new record file and calculates the available recording time based on the amount of disk space available.
4. **Make sure the input is record enabled.**

Releasing a Record File From Use as the Designated Record File

You can't perform certain operations on a file when it is the designated record file. For instance, you can't delete it or remove it from the file list (see "Chapter 20: File Management").

To release a file from use as the record file:

1. **Press and hold the mouse on the Record File options icon.**
   Studio Vision opens a pop-up menu of Record File options.



2. **Select Close "<file name>" from the pop-up menu.**
   Studio Vision releases the record file and shows the name of the input's record file as "(none)." If desired, you can now designate a new record file by selecting **New Record File** from the pop-up Record File options menu.

The released file is still stored on your hard disk and, if you have audio events in your current sequence that reference data in the file, it will still be listed in the File Management dialog box. For more information about file management, see "Chapter 20: File Management".

Appending Audio to Files

If you release a record file from use or change the designated record file and decide later that you want to record more audio into a file you already recorded to, you can append the new audio to existing audio in a record file. To do so:

1. **Press and hold the mouse on the Record File options icon.**
   Studio Vision opens a pop-up menu of Record File options.

2. **Select Append to File from the pop-up menu.**
   Studio Vision opens the Append to File dialog box.

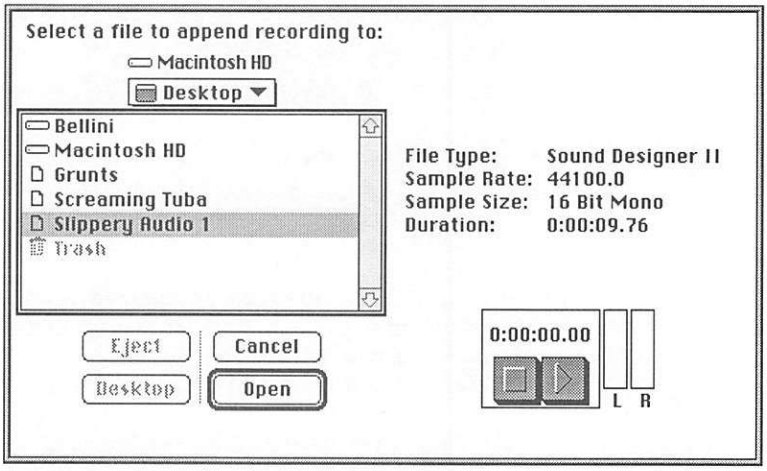
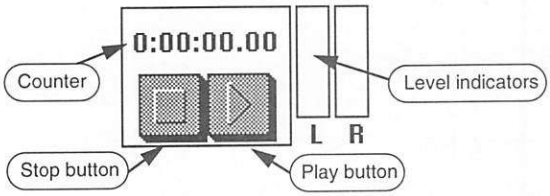


Figure 11.6: Append to File Dialog Box if Using DAE

The left half of the Append to File dialog box is basically a standard Macintosh Open dialog box. The right half of the dialog box displays information about the selected file and allows you to listen to it.

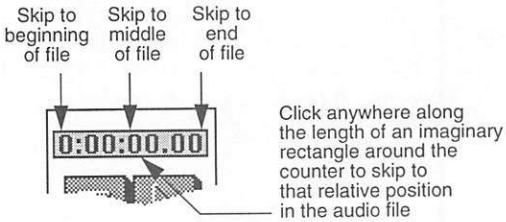
3. **Use the left half of the dialog box to find the file onto which you want to append the new audio, then click it to select it.**

4. **If you want to play the file, click the Play button in the dialog box.**
   Studio Vision will play back the selected file and indicate its signal level.



5. **Click the Stop button to stop playing the file.**
6. **Click the Open button to open the selected record file.**
   Studio Vision will now append any newly recorded audio to the selected file.

HINT: You can skip to different positions in an audio file by clicking along the length of the counter. Think of the area occupied by the counter as a small graphic representation of the length of your audio file. Clicking near the right edge of the counter skips to the end of the file. Clicking near the left edge of the counter skips to the beginning of the file. Clicking near the middle skips to the middle of the file



Alternately, you can open the Append to File dialog box as follows:

1. **Press and hold the mouse on the Record File options icon and select New Record File from the pop-up menu.**

Studio Vision opens the Save As dialog box.

2. **Click the Append to File button.**

Studio Vision opens the Append to File dialog box.

Auto Compacting a File

Compacting is a process that frees disk space. It retains audio that events in the current sequence file point to, and throws away audio that the current sequence file doesn't point to. Remaining audio moves together, and the space freed up becomes accessible to future recordings.

If you check the Auto Compact option in the Record Monitor window, Studio Vision compacts the current record file, if necessary, at the end of each record take. It's the same as if you opened the File Management dialog box and used its **Compact** command (as discussed in "Compact" on page 199).

If you compact your record file, and you've named your sequence file, compacting will re-save your sequence file. This ensures that the files remain consistent. Therefore, don't compact if you don't want your sequence file saved—saving the file means you cannot revert later.

Keep in mind that you can always undo recording, even after your record file has been compacted (unless you use the **Clear Clip and Undo** command discussed in "Clear Clip and Undo" on page 206).

Choose an Audio Instrument

You assign audio events to Audio Instruments in the same way you assign MIDI tracks to Instruments. Audio Instruments let you use volume and pan to control the playback of the audio event. They also let you view, edit, and playback multiple audio events in a single track—each Audio Instrument appears in its own row in a Graphic window.

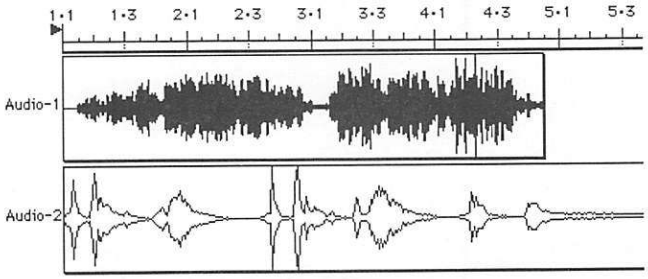
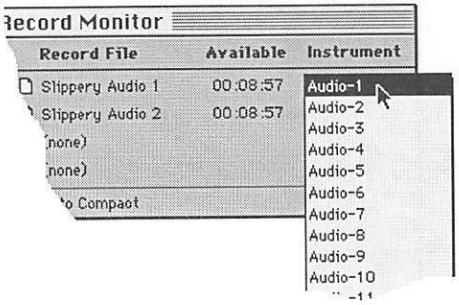


Figure 11.7: Audio Instruments Assigned to Audio Events

If you record multiple events into the same record file, each successive take will be appended onto the last. All events in the file will be on the same Instrument unless you choose a different Audio Instrument before each take.

You assign Audio Instruments to audio events by selecting an Audio Instrument in the Record Monitor window's Instruments column. To do so:

1. **Press and hold the mouse in the desired input's Instruments column.**
   Studio Vision opens a pop-up menu of Audio Instruments.



2. **While still holding the mouse button, drag the cursor over the desired audio instrument to select it (highlighting it).**

3. **Release the mouse button.**
   Studio Vision will assign the audio event that you record to the selected Audio Instrument.

After you record audio you can change the Audio Instrument assigned to the audio event in the file, or, if there are multiple recordings in the file, you can assign different Audio Instruments to specific audio events in the file. For instance, you might want all chorus takes assigned to one Instrument and all percussion takes assigned to another so that you can mix both types of audio independently.

You can reassign an event to a particular Audio Instrument by selecting it in an edit window and choosing **Do>Set Instrument**. For more information about Audio Instruments, see "Chapter 15: Working with Audio Instruments".

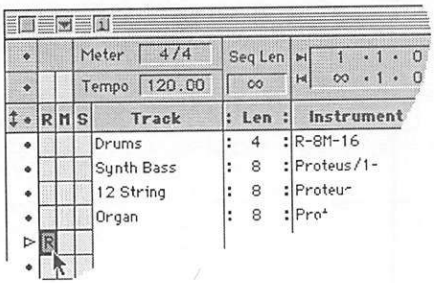
❑ Record a Track

Now that you've set a record level and designated one or more files into which you want to record the audio, you're ready to record a track.

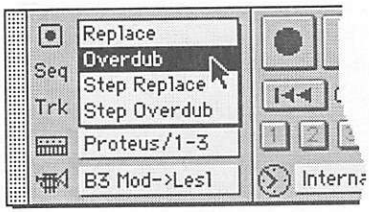
IMPORTANT: Before you begin recording audio, if you have any MIDI in your sequence, make sure you're satisfied with the sequence's tempo. Once you record audio, changing the tempo of the sequence changes the way the MIDI and audio line up with each other causing them to be out of sync.

To record an audio track:

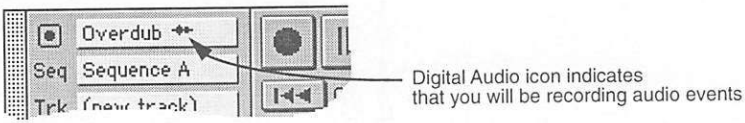
1. **Leave the Record Monitor window open.**
   The Record Monitor window must be open in order to record audio into Studio Vision.
2. **In the Tracks window, click the "R" column to record enable a track (just as you do when you record MIDI).**



3. **If desired, type a new track name.**
4. **Select the desired record mode from the Record Mode pop-up menu (in the Control Bar).**



If you are about to record an audio event, the record mode display contains a small digital audio icon.



5. **In the Control Bar, either set a Countoff or select Wait for Note.**
6. **Click the Record button in Studio Vision's Control bar.**
7. **If you chose Wait for Note, either play a MIDI note, click the Play button, or press the Spacebar to start recording.**

8. **Play or sing into your digital audio input device. Studio Vision will also record any MIDI you perform.**
9. **Click the Stop button when you want to stop recording.**

The audio you record will be recorded into the current record file (or files) listed in the Record Monitor window. Remember, if you want to record into another file, you need to first designate it as the record file.

If you have the Graphic window open you'll see a graphic representation of your waveform appear below the Piano Roll.

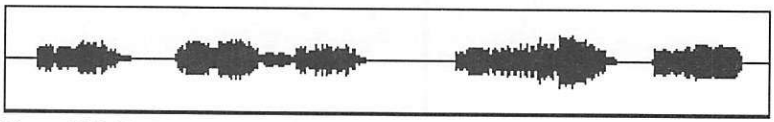


Figure 11.8: Waveform Displayed

The appearance of the waveform is determined by whichever option is selected in the **Audio>Waveform Display** submenu. Specifically:

- **Off**: This display option completely disables the waveform display. When you select this option, Studio Vision displays waveforms as a straight line and wastes no time calculating their appearance.
- **Fast**: This display option allows Studio Vision to redraw waveform displays quickly because it draws them at a low resolution. This may be desirable when you're recording or playing back audio, but the lower resolution is not as good for detailed audio editing.
- **High Resolution**: This display option allows Studio Vision to display the actual texture of waveforms. This is desirable when you're editing and need to clearly see all peaks and valleys, but it takes the longest amount of time to recalculate and draw.

See "Waveform Display" on page 251 for more information.

NOTE: Remember, if you want to turn audio recording off so you can record only MIDI, uncheck the Record boxes in the Record Monitor window or simply close the window. You can see if audio recording is enabled by looking for the little digital audio waveform in the Record Mode display.

❑ Save the Sequence

Save your sequence file when you're done recording audio events. To do so:

1. **Choose File>Save.**

   Studio Vision will save the file.

   If you haven't yet named the sequence file, Studio Vision opens a standard Macintosh Save As dialog box. Use the dialog box to name and save the sequence file.

Studio Vision saves all your audio events with the current sequence file. The next time you open the sequence file, Studio Vision will locate the digital audio files referenced by that sequence file, and will alert you if any are missing.

Locating Missing Audio Files

If you change the name of an audio file, delete it, or move it onto a different disk or into a different folder, Studio Vision won't be able to locate the audio data necessary to play back the sequence. When you attempt to open a sequence that references this file, you'll be prompted by a dialog box (which is the same as the Import dialog box) to locate the missing file.

NOTE: You can audition files from this dialog box to make sure you are selecting the correct one. Just select the file by clicking on it and click the **Play** button.

If you can't locate the file and want to open the sequence regardless, click **Cancel**. All data except that file will open in the sequence.

TIP: If there is more than one audio file missing and you wish to avoid locating all of them, hold down the Option key when you click **Cancel** in the first dialog box.

CHAPTER 12: Importing Audio Files with DAE

This chapter discusses how to import audio into Studio Vision when using DAE. If you're using Studio Vision with Sound Manager, read "Chapter 7: Importing Audio Files with Sound Manager".

❑ Import Basics

You can import audio files from various sources that use any of the following file formats:

- Sound Designer
- Sound Designer II
- AIFF
- Dyaxis

You can import audio recorded at any sample rate. Eight bit files cannot be imported with DAE. If you want to work with 8-bit files, use Studio Vision with Sound Manager.

To import audio:

1. **Open a Graphic or List window and set an input edit point.**

   Alternately, you could click in the Track Overview portion of the Tracks window to set an input edit point.

   Without an input edit point, the **Import Audio** command is disabled.

2. **Choose Audio>Import Audio.**

   Studio Vision opens the Import Audio dialog box. This is the standard Digidesign Import Audio dialog box found in all DAE-compatible applications.

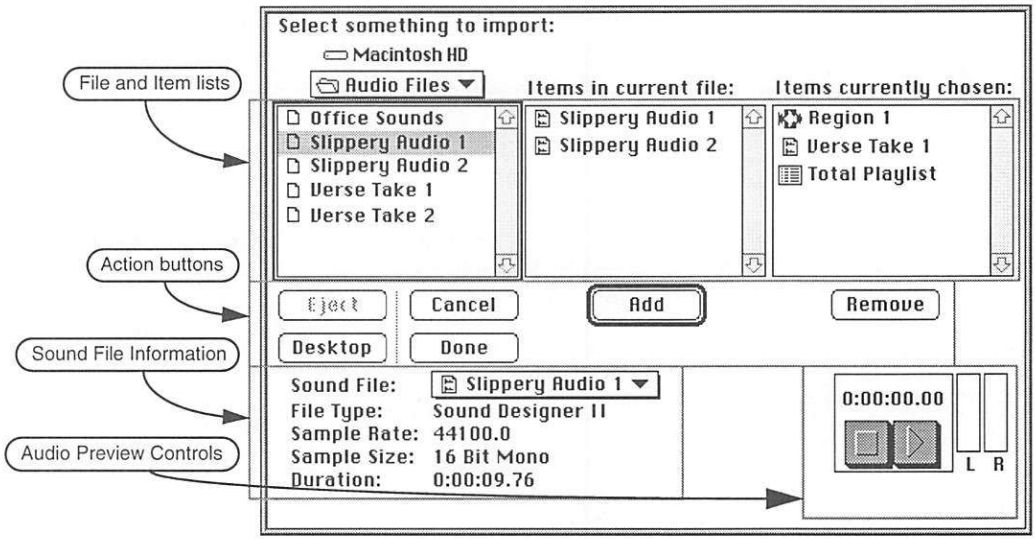
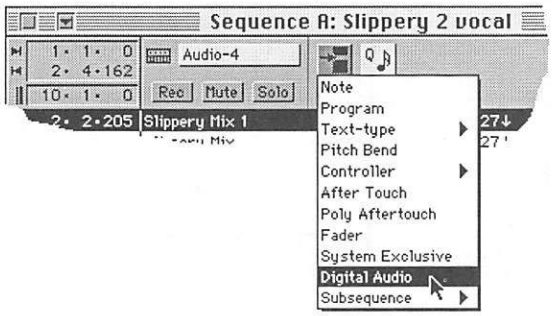


Figure 12.1: Import Audio Dialog Box for DAE

TIP: You can quickly import files by clicking with the Insert Pencil tool anywhere in the Audio Pane at the location where you want to enter the file. This will open the Import Audio dialog box.

In a List window, there's an additional way to open the Import Audio dialog box:

1. **Set an input edit point in the List window.**
2. **Press and hold the Insert Events button.**
   Studio Vision opens a pop-up menu.



3. **Select Digital Audio from the pop-up menu.**
   Studio Vision opens the Import Audio dialog box.

About the Import Audio Dialog Box

As shown in Figure 12.1, the Import Audio dialog box contains many elements. These are discussed in each of the following sections.

File and Item Lists

The Import Audio dialog contains three scrolling lists:

- Left list: This is a standard list of folders and files on your hard disk. Use this to find the audio files on your hard disk.
- Middle list: This list shows the items available for import in the selected file.
- Right list: This list shows the items that will be imported when you click the **Done** button.

There are three types of items available within each sound file. Each of these is indicated with a unique icon. They are:

Icon	Type of Item	Description
	Region	This is a designated region of a Sound Designer II file (see your Sound Designer II manual for details).
	Playlist	This is a Sound Designer II play list (see your Sound Designer II manual for details).
	Entire Sound File	This is an entire sound file of either Sound Designer II, AIFF, or Dyaxis formats.

NOTE: Studio Vision does not recognize Sound Designer II cross fade settings.

Action Buttons

Use the action buttons to navigate your hard disk and select items to import into your Studio Vision document.

There are six action buttons:

- **Eject** button: Click this button to eject a floppy disk or other removable media.
- **Desktop** button: Click this button to move the first scrolling list to the desktop level.
- **Cancel** button: Click this button to cancel the import operation; no audio will be imported.

- **Done** button: Click this button to import all items in the *right* list into the current Studio Vision document. You can import several sound files, regions, or playlists at the same time, from several different sources.
- **Add** button: Click this button to move the selected item in the middle list to the right list, making it ready to import.
- **Remove** button: Click this button to remove the selected item from the right list.

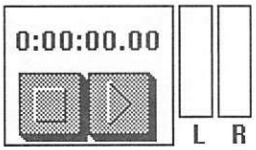
Sound File Information

This area contains information about the currently selected item in any of the lists. Click the pop-up menu to view the location of the item on your hard disk.

Sound File:	Demo
File Type:	Audio IFF (AIFF)
Sample Rate:	44100.0
Sample Size:	16 Bit Mono
Duration:	0:00:05.29

Audio Preview Controls

Use these controls to listen to an item in either the middle or right list.



The timer will show the time while playing. You can skip to any location in an audio file by clicking along the length of the counter. If you click toward the right of the counter, you'll skip to the end of the song. If you click toward the left of the counter, you'll skip to the beginning of the song. If you click toward the middle of the counter, you'll skip to the middle of the song. This is helpful when you are previewing a long file. For more information, see the hint in "Appending Audio to Files" on page 90.

CHAPTER 13: Syncing to SMPTE with DAE

This chapter discusses how to use Studio Vision and DAE to synchronize audio playback with an external SMPTE source. If you're using Studio Vision with Sound Manager, read "Chapter 8: Syncing to SMPTE with Sound Manager" in place of this chapter.

❑ Sync Modes

As discussed in the Vision Reference manual, Studio Vision offers four sync options:

- **Internal Clock:** Use this to sync MIDI and/or digital audio to the Macintosh's internal clock. **Internal Clock** does not sync data to SMPTE.
- **External Beat Clock:** Use this to sync MIDI only (not audio) to an external clock source that sends 24 pulses per quarter note. Beat clocks are tempo dependent; they are not real time. **External Beat Clock** is used primarily for syncing to a drum machine, a sequencer, or another computer.
- **MIDI Time Code**: Use this to sync MIDI, digital audio, or both data types simultaneously to an external SMPTE clock source (such as an audio tape, a video deck, or a synchronizer).
- **MTC/Machine Control**: If you have a tape machine that supports MIDI Machine Control, and you've installed the AV-OMS driver in the OMS folder in your System folder, you can use Studio Vision to control the machine. Detailed instructions for using MIDI Machine Control are in your Vision Reference manual but a brief overview is presented in "MIDI Machine Control" on page 110.

  The MTC/Machine Control option will not appear unless you've installed the AV-OMS driver in the OMS folder in your System folder.

All the previously mentioned sync options are available either from the **Options** menu's **Receive Sync Mode** submenu or from the Control Bar's Master Sync Mode pop-up menu.

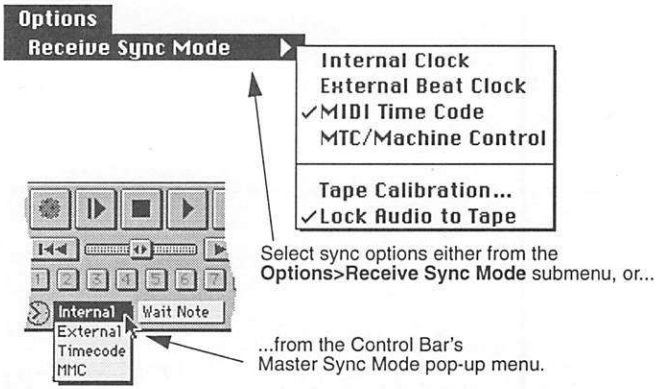


Figure 13.1: Receive Sync Modes in the Options Menu and Control Bar

❑ Digital Audio Sync Methods

There are three methods you can use to sync digital audio to tape:

- **Hardware Sync**

  This is the most expensive option, but is the only way to achieve tight sync with zero audio distortion. For Hardware Sync, you need a sync converter box (such as a Digidesign SMPTE Slave Driver, Pro I/O, or similar device) or black burst generator that will sync all of your audio gear.

- **Sync to Tape**

  Sync to Tape (using the **Lock Audio to Tape** option) results in tight sync but can distort the audio signal. (This distortion may or may not be audible.)

- **Tape Calibration**

  Using the Tape Calibration method is the only way to avoid on-the-fly conversion while locking audio to tape without external hardware. Vision will adjust the placement of audio events (and MIDI events) according to the speed of the tape. However, because Vision is not constantly monitoring the tape speed and adjusting the digital audio playback, there may be some drift, especially during long audio events.

The following sections discuss each synchronization method in detail.

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Hardware Sync

By far the best way to sync audio to tape is with hardware synchronization. Unfortunately, it's much more expensive (on the order of $3000), but it's completely accurate, high-quality, and easy to use—especially compared to the methods described in the following sections. There are two basic forms of hardware sync:

- syncing your entire studio to a video sync source
- syncing your audio to any SMPTE signal

To use either of these options:

1. **Select Audio>Hardware Setup and set the Sync Mode to Digital.**
2. **Set Studio Vision's Receive Sync mode to Timecode.**
3. **Make sure that Options>Receive Sync Mode>Lock Audio to Tape is disabled (unchecked).**
4. **Make sure that Tape Calibration is set to "0.0000%" as discussed in "Tape Calibration" on page 108.**

To sync your entire studio to a video sync source, you must use Pro-I/O in a Sound Tools system, or a system with an Audio Interface (Sound Tools II or Pro Tools). You need a video sync generator that makes a blackburst or a house sync signal. Your tape machine that plays the tapes containing the SMPTE signal must be controlled by a synchronizer, which is in turn controlled by the video sync generator. The video sync is connected either directly to the Pro-I/O or through a Digidesign Video Slavedriver or TimeLine MicroLynx with the word clock option installed to your Audio Interface.

To sync your audio to any SMPTE signal you'll need a system with an Audio Interface (Sound Tools II or Pro Tools). Use the TimeLine MicroLynx with the word clock option installed, or the Digidesign SMPTE Slavedriver. Send your SMPTE to one of these devices, and connect the external clock output to your Audio Interface.

Lock Audio to Tape

Lock Audio to Tape uses DAE's on-the-fly sample rate conversion capability to match the audio playback to the received SMPTE. Unfortunately, the real-time sample rate conversion isn't perfect: some amount of distortion is introduced in the process. Also, the pitch of the audio varies with the speed of the tape, and if your audio has long, sustained tones, this pitch variation is sometimes noticeable. Of course, the pitch of MIDI data never varies.

If you've already recorded your audio, and if slight changes in its pitch aren't noticeable, **Lock Audio to Tape** is the best choice for you: it's much easier and more reliable than **Tape Calibration**. You can also record audio while locked to tape. To do so:

1. **Select the Options>Receive Sync Mode>Lock Audio to Tape option to check it.**
2. **Record-enable a track and begin to record digital audio.**

   Studio Vision constantly monitors the speed of your tape and adjusts the sample rate to match the speed of the tape. This results in "on-the-fly" conversion. On-the-fly conversion is discussed in more detail in "About Sample Rate Conversion" on page 207.

Using this method will lock the digital audio tightly with the tape, but because on-the-fly conversion is being applied to the audio signal during both recording and playback, the signal is distorted twice. In this case, you're trading audio purity for tight sync. If tight sync is a must, try running a few experiments on your own—you may find the conversion distortion hardly noticeable.

Tape Calibration

This method of syncing audio to tape can be somewhat difficult to use, but if you must record audio synced to an existing tape, it's the only option. Also, unlike **Lock Audio to Tape**, there's no distortion of the audio due to sample-rate conversion (assuming your sound files are recorded at the hardware sample rate).

The idea of **Tape Calibration** is that the audio always plays at its normal Internal speed, even in Time Code mode. Since the tape might not be at the same speed, if Studio Vision knows how far it's off, it can compensate by that amount. It compensates when playing MIDI in Internal mode, and it also uses the calibration factor when starting in the middle of the tape to compute where in the audio to start.

Here's an exaggerated example. Suppose that you have a reel-to-reel tape with SMPTE recorded at 3-3/4 ips, but now you're using it at 7-1/2 ips. The SMPTE plays back twice as fast as it's supposed to, but you record music on the other tracks at 7-1/2, so they sound right. You want to transfer this into Studio Vision, make some edits, add some MIDI, and transfer it back. The first thing you'll have to do is calibrate the tape using the method described below: Studio Vision will notice that your tape is 100% fast (it might actually measure something like 95.4238% fast or 103.2948% fast). Once you've done this, you can record the tape into Studio Vision. Play the tape back along with the audio from several locations to make sure you've gotten the calibration as close as you can. Of course, 30 seconds of actual elapsed audio time will be one minute

of SMPTE time. Any MIDI you play or record will go at the speed of the tape, even in Internal mode: if you want quarter notes at 120 bpm, you'll have to set a tempo of 60 bpm because time will pass twice as quickly as usual. Of course, with an actual (not exaggerated) scenario, you can set the tempo you really want: the tape will probably be off by less than a percent.

One drawback of tape calibration is that not only doesn't the tape play at exactly the same speed as Studio Vision, it doesn't all play at the same speed itself, so finding one calibration value that is guaranteed for the whole sequence isn't necessarily possible. (DAT decks and the ADAT don't have this problem, fortunately). Every time you stop and fast forward your tape, it may stretch just a little, further distorting the uniformity of the SMPTE stripe (and any other recorded tracks) you originally laid down.

Since tape calibration effectively changes the tempo of MIDI without changing the speed of audio, you must calibrate your tape before recording audio into Studio Vision, and you should check the calibration and re-record the audio before recording any MIDI. Once you've recorded both audio and MIDI, changing your tape calibration will move these out of sync.

To calibrate the tape:

1. **Select the Options>Receive Sync Mode>Tape Calibration option to check it.**

   Studio Vision opens the Tape Calibration dialog box.

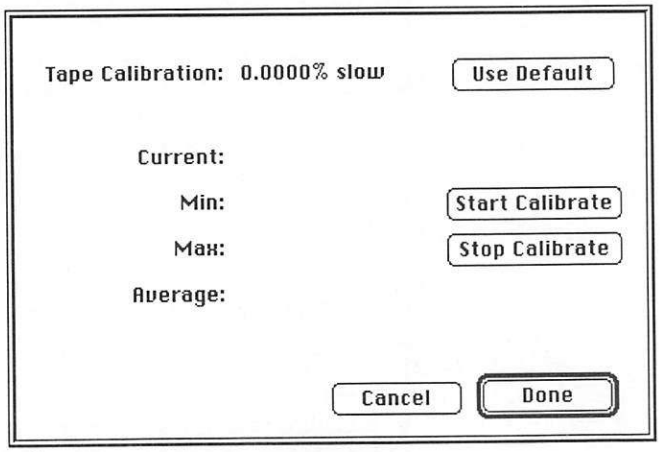


Figure 13.2: Tape Calibration Dialog Box

The tape calibration displayed at the top of this dialog box shows you the current tape calibration for the file.

2. **Click the Start Calibrate button, then start the tape.**
3. **Let it run for the entire length of the SMPTE stripe you intend to sync to.**

Every second as it calibrates, the reading for the past second is shown as **Current**. The minimum and maximum readings are shown to give you an idea of how consistent your tape is. The average reading at the bottom will become the new current tape calibration when you click **Stop Calibrate** and then **OK**. If you click **Cancel**, the entire calibration session will be ignored. The **Use Default** button sets the current calibration to zero (not fast or slow).

IMPORTANT: If you remove your SMPTE clock source, don't change tape calibration. Audio must continue to play at the calibrated rate in order to sync to MIDI. The calibration value is stored with your sequence file, ensuring the correct audio playback rate even without the external clock source.

Recording Audio While Synced to SMPTE

You must calibrate your tape first in order for audio you record to sync to previously recorded MIDI and audio.

If you've already recorded MIDI or digital audio synced to SMPTE on another channel, don't record audio while synced to SMPTE; record it using **Internal Clock** and play it back synced to SMPTE. If you don't do this, the audio you're recording will not correctly line up with audio and MIDI on other channels during playback. This is because sample rate conversion never occurs when recording digital audio (Studio Vision always records at the session sample rate)—even when synced to SMPTE.

❑ MIDI Machine Control

If you have a tape machine that supports MIDI Machine Control, you can use Studio Vision to control the machine. Detailed instructions for using MIDI Machine Control are in your Vision Reference manual.

PART 4: Working with Digital Audio

CHAPTER 14: Viewing, Selecting and Moving Audio Events

❑ Audio Events in Different Windows

You can select audio events for editing either in:

- the Graphic window (in the area between the Piano Roll and the Strip Chart)
- the Tracks window's Track Overview area
- the List window

Events you select in one window get selected in the other, and each window updates to display changes after editing.

Graphic Window

Audio events are displayed as waveforms in the Graphic window (between the Piano Roll and the Strip Chart). The Audio Pane lies between the Piano Roll and the Strip Chart.

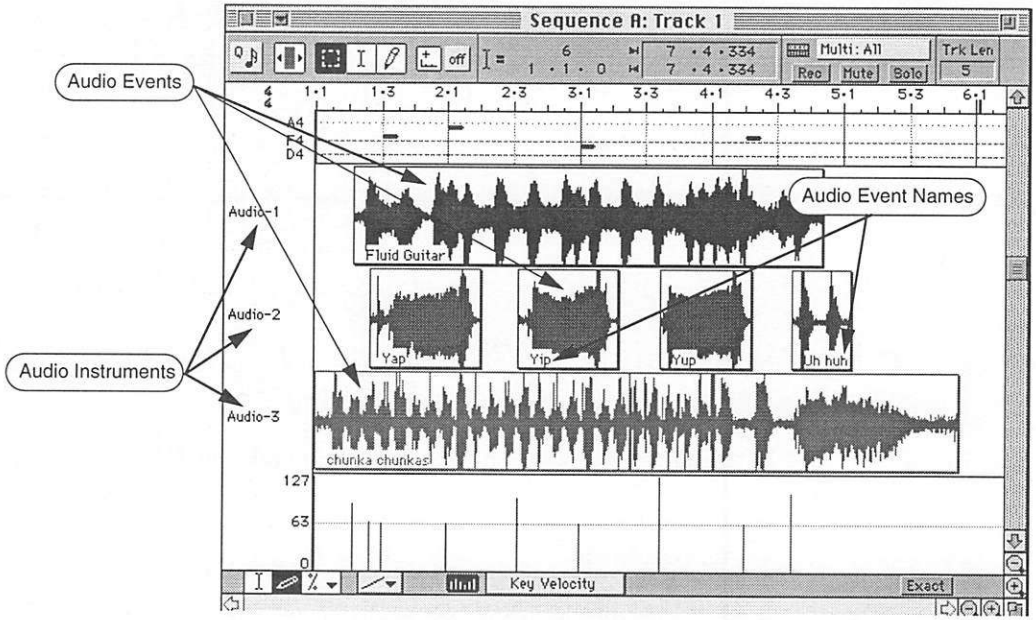


Figure 14.1: Typical Audio Graphic Window with Multiple Audio Events & Instruments

Tracks Window

Audio events are displayed as waveforms in the Track Overview area of the Tracks window.

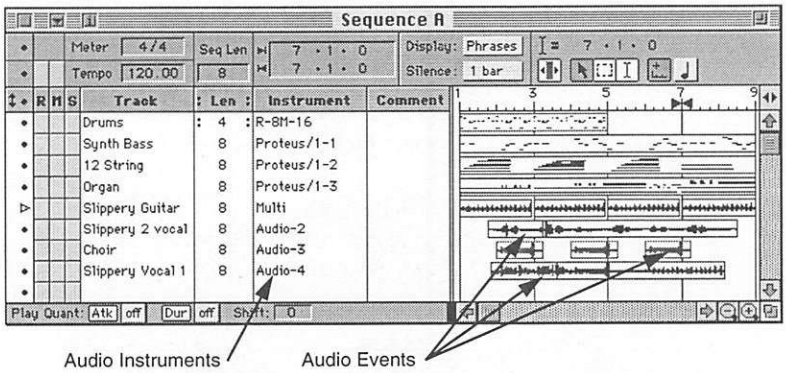


Figure 14.2: Typical Tracks Window with Audio Tracks

If a track contains multiple Audio Instruments, the Track Overview area will show any Audio Instruments with overlapping times as though they were a single Instrument. For more information, see "Audio Events and Track Overview" on page 123.

List Window

Audio events are displayed in a chronological list (along with MIDI and text events) in Studio Vision's List window.

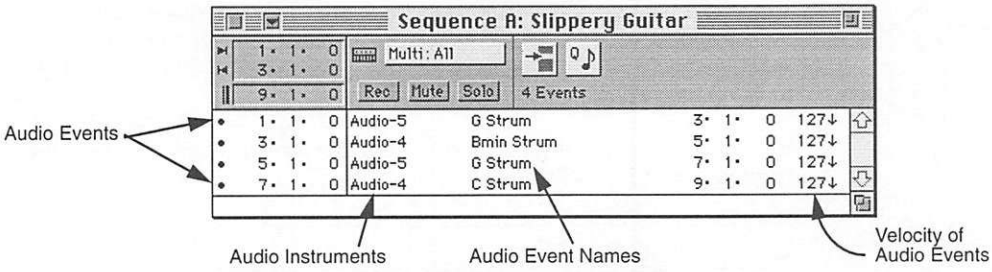


Figure 14.3: The List Window Displaying Audio Events

❑ Viewing Audio Events as Waveforms

In the Graphic and Tracks windows, Studio Vision displays each audio event as a waveform.

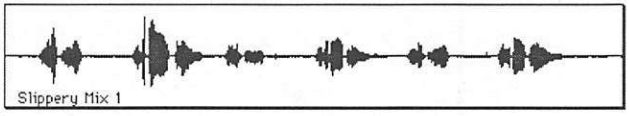


Figure 14.4: Waveform Audio Event

Sound can be visually interpreted by placing its data on a graph as a waveform. The vertical axis represents amplitude and the horizontal axis represents time. Figure 14.5 shows a waveform zoomed in to show two cycles of a simple sine wave.

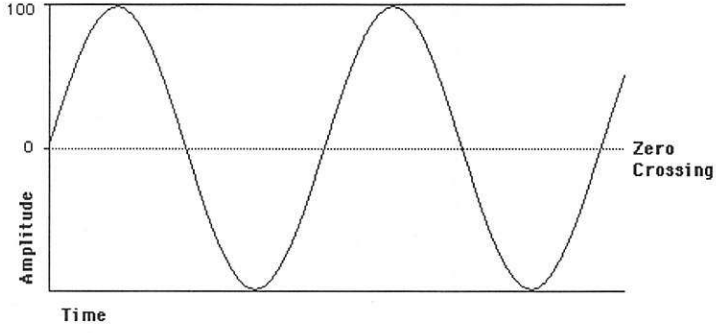


Figure 14.5: Simple Waveform (Sine Wave)

You can separate Studio Vision audio event waveforms into sections so that you can manipulate ranges of sound. For instance, if you recorded someone speaking you could rearrange the words in any order, cutting and pasting sections of the waveform.

Ranges you separate during edit operations become new audio events with new begin times and durations.

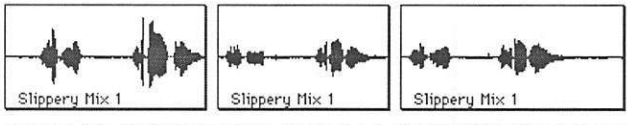


Figure 14.6: Audio Event from Figure 14.4 after Dividing into 3 Separate Events

When you edit audio events, you will most likely want your edit points to begin and end in low amplitude levels of the waveform. Edit points that occur in amplitude levels higher than zero can produce audible clicks on playback; the higher the amplitude, the more likely it is that there will be clicks.

Studio Vision attempts to avoid unwanted clicks by automatically playing from the closest point where the waveform crosses the zero amplitude level (called the zero crossing). No matter what type of waveform you're working with, the distance between zero crossings is short enough that when Studio Vision plays from the closest zero crossing, the change is not noticeable.

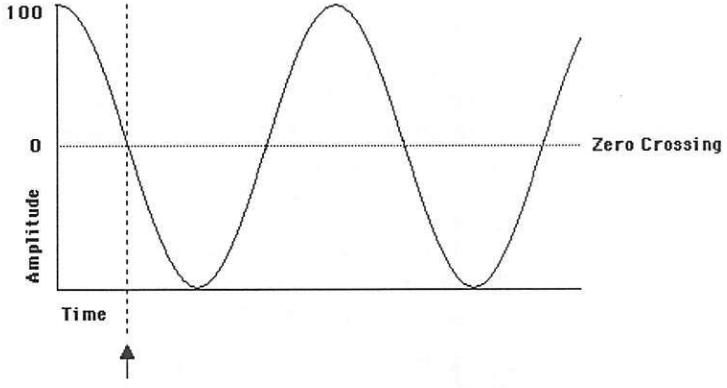


Figure 14.7: Studio Vision Moves the Edit Point to the Closest Zero Crossing

You should avoid placing your edit point in a high amplitude area because Studio Vision may not completely eliminate the click.

NOTE: Use a sample editing program such as Sound Designer II if you want to edit actual wavedata. You can open Sound Designer II directly from Studio Vision by choosing **Audio>Edit Event SoundFile**. For more information, see "Edit Event Soundfile" on page 241.

Waveform Display Options

Studio Vision gives you three display choices for waveforms. These choices are available in the **Audio>Waveform Display** submenu.

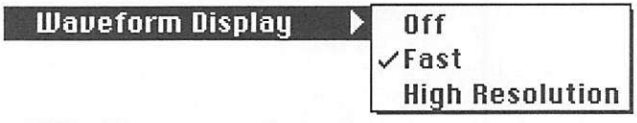


Figure 14.8: Waveform Display Options

The three waveform display options are:

- **Fast**, which allows Studio Vision to redraw waveforms fairly quickly, a useful feature during recording sessions.
- **High Resolution**, which—*if you are zoomed in enough*—displays waveforms in greater detail than **Fast** mode, showing clearly the peaks and valleys of the waveform, a useful feature during editing procedures.
- **Off**, which displays a waveform as a rectangular bar. This takes Studio Vision virtually no time to draw and is useful if you want to work extremely quickly and viewing the waveform is not a concern.

For details about each of these display options, see "Waveform Display" on page 251.

❑ Audio Event Names

Viewing Audio Event Names

If the **Audio>Display Names** option is enabled, audio event names are displayed in the lower left corner of the event in the Graphic window. This option does not affect audio event names in the List window (where names are always displayed and can be edited) or the Tracks window (where the waveform is too small to contain any text).

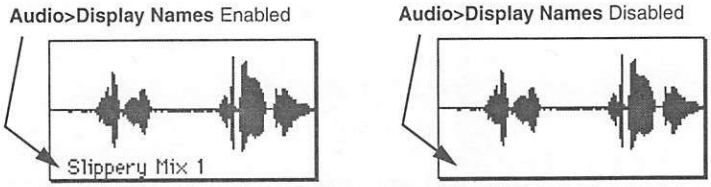


Figure 14.9: Displaying Audio Event Names in a Graphic Window

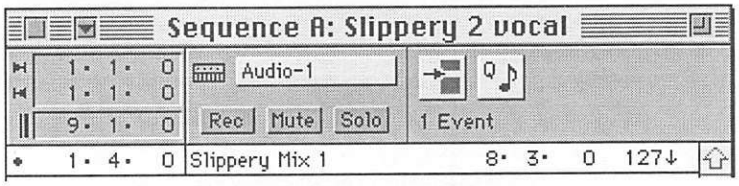


Figure 14.10: Audio Event Name Displayed in a List Window

Renaming Audio Events

Audio event names initially default to the name of the associated audio file or region. However, you can rename audio events for easier identification.

When you're working in a List window, simply click the event name in the list and type a new name.

When you're working in the Graphic window, you name audio events in the Audio Event Info dialog box. To do so:

1. **Click an event to select it.**
   The waveform becomes hollow.
2. **Choose Audio>Get Event Info.**
   Studio Vision opens the Audio Event Info dialog box.

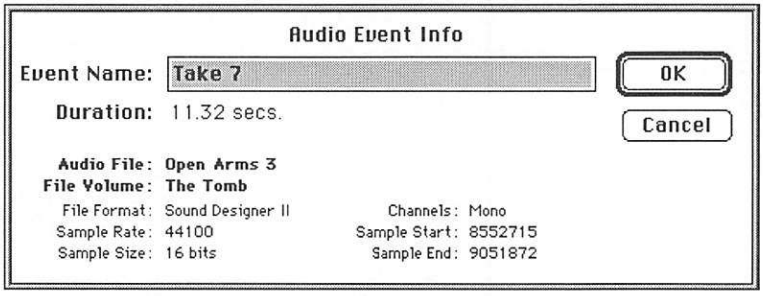


Figure 14.11: Audio Event Info Dialog Box

Alternately, if **Display Event Names** is enabled, you can open the Audio Event Info dialog box by positioning the cursor over the audio event name (it becomes a question mark) and clicking.

3. **Click in the Name field and type a new name for the audio event.**
   The rest of this dialog box displays information about the particular audio event.
4. **Click the OK button**
   Studio Vision renames the audio event.

❑ Selecting Audio Events

Selecting Entire Audio Events

To select an entire audio event in a Graphic window:

1. **Move the cursor into the top third of the waveform (the upper select region).**

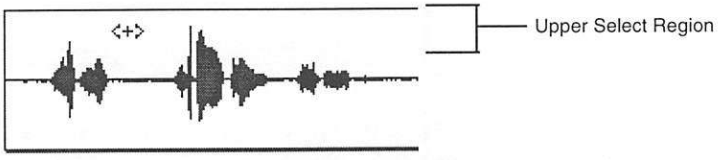


Figure 14.12: The Upper Select Region is the Top Third of the Event

If your cursor is positioned in the center of this select region, it will become a Vertical Move cursor; if your cursor is in the left of the select region, it will become a Horizontal Move cursor; if it's in the right, it will become a Right Trim cursor (discussed in "Changing Audio Event Lengths" on page 135).

<+>	↕	+<>
Horizontal Move Cursor	Vertical Move Cursor	Right Trim Cursor

Figure 14.13: The Three Editing Cursors

2. **Click the mouse.**

The entire waveform becomes hollow to indicate it's selected.

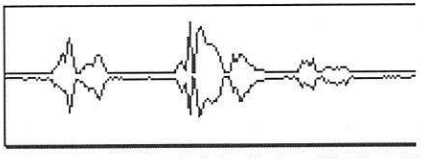
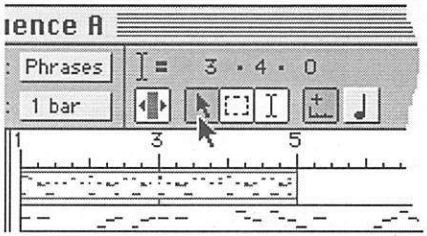


Figure 14.14: Selected Audio Event in Graphic Window

To select an entire audio event in a Tracks window:

1. **In the Tracks window, select the Arrow cursor.**



2. **In the Track Overview, click the desired audio event to select it.**

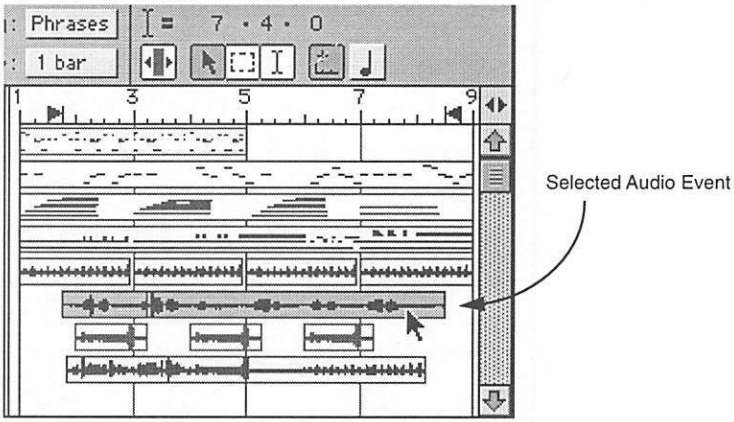


Figure 14.15: Selected Audio Event in Tracks Window

NOTE: If the Track contains more than one Audio Instrument, selecting an event in the Track Overview area will actually select all events that occur within the same range of time. For more informations, see "Audio Events and Track Overview" on page 123.

To select an entire audio event in the List window, simply click its selection dot.

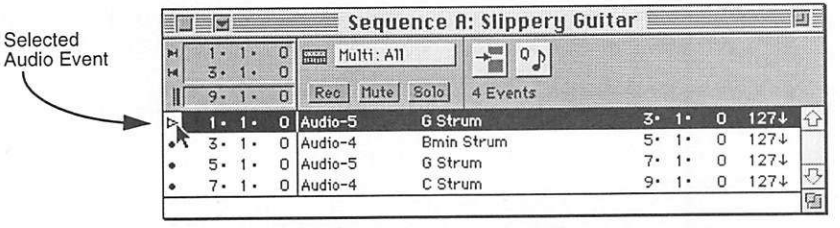


Figure 14.16: Selected Audio Event in List Window

Audio Events and Track Overview

If a track contains multiple Audio Instruments, the Track Overview area will show any Audio Instruments with overlapping times as though they were a single Instrument.

For example, if the Graphic Window looks as follows:

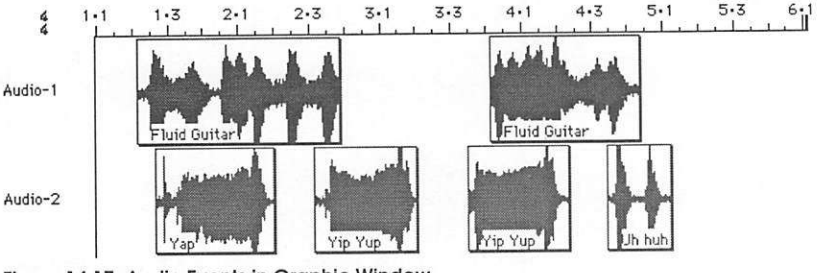


Figure 14.17: Audio Events in Graphic Window

...then the Tracks window looks like Figure 14.18:

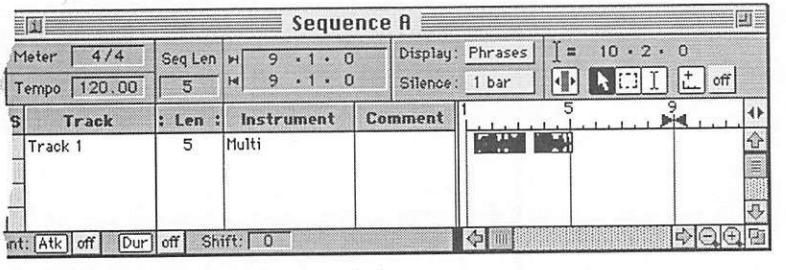
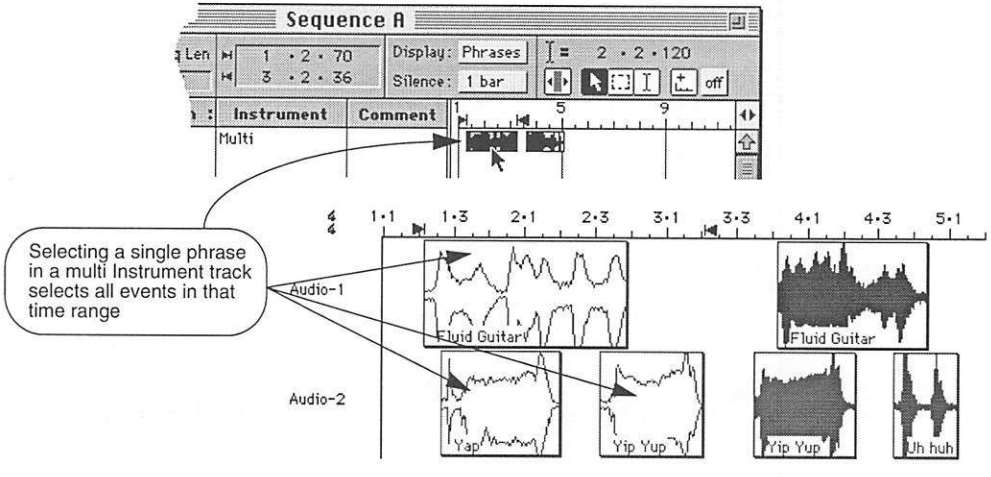


Figure 14.18: Audio Events in Tracks Window

Notice, in Figure 14.18, that the Tracks window shows only two phrases even though there are six audio events. This is because the first "Fluid Guitar" event is overlapping in time with the "Yap" event and the first "Yip Yup" event, creating a single phrase in the Tracks window. The second "Fluid Guitar" event is overlapping in time with the second "Yip Yup" event and the "Uh huh" event, creating the second phrase in the Tracks window.

Be aware that, when you select a phrase in the Track Overview area, you will actually be selecting all events that the Tracks window displays as part of that single phrase.



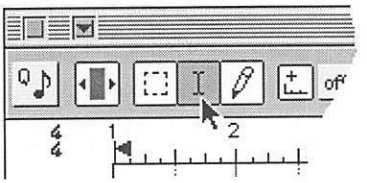
This is particularly useful if you want to select and edit multiple Audio Instruments together. For example, if your track contained lead and harmony vocals, selecting a single phrase in the Track Overview area would select all vocals that occur at the same time, allowing you to edit them simultaneously.

Selecting Portions of Audio Events

You can also select portions of audio events to edit. Only the selected portion will be affected; the rest of the audio event will be unaltered.

To select a portion of an audio event:

1. **Select the I-Beam cursor by clicking its icon in the Graphic window.**



The I-Beam selects audio events on all Audio Instrument in the selected track.

2. **Move the cursor into the lower two thirds of the waveform (the lower select region).**

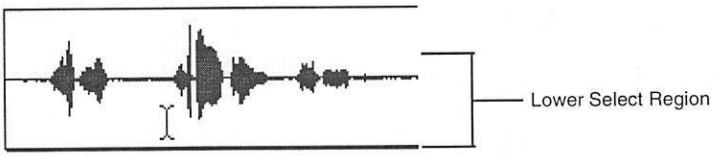
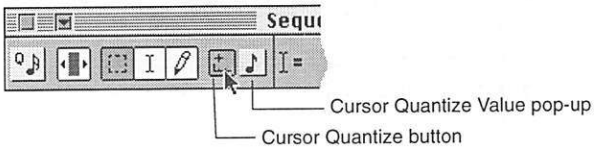


Figure 14.19: The Lower Select Region is the Bottom Two Thirds of the Event

3. **If you wish to constrain cursor movement to a specific metric value, turn on Cursor Quantize and select a quantize amound from the pop-up menu.**



4. **Drag across the range you wish to edit.**

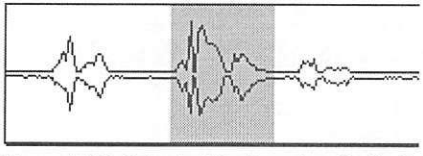


Figure 14.20: Selected Portion of an Audio Event

You'll notice that when you select a portion of an audio event, the entire event becomes hollow and the range you drag across becomes highlighted (as shown in Figure 14.20. Some editing commands (such as **Copy**, **Cut**, etc.) affect only the highlighted range. Other commands (such as **Quantize** or **Set Instrument**) operate on the entire (hollow) event. Various editing operations are discussed throughout this manual.

Selecting Events on All Audio Instruments

In the Graphic window, if you have more than one Audio Instrument in the selected track, you'll notice the I-Beam selects across all of them.

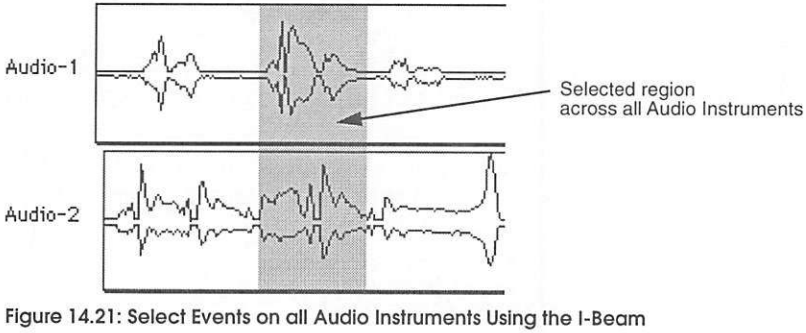


Figure 14.21: Select Events on all Audio Instruments Using the I-Beam

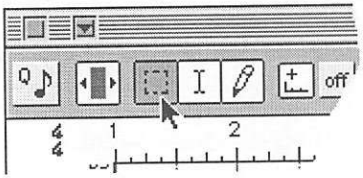
NOTE: Events assigned to different Audio Instruments appear in different rows in a Graphic window.

"Chapter 15: Working with Audio Instruments" describes in detail how to move events between Audio Instruments. You initially set Audio Instruments for audio events by clicking the event to select it, then choosing **Do>Set Instrument**.

Selecting Portions of Events on Specific Audio Instruments

To select an event (or portions of an event) on specific Audio Instruments:

1. **Select the Marquee tool by clicking its icon in the Graphic window.**



2. **Move the cursor into the desired audio event's lower select region.**
3. **Drag over the range you want to edit.**

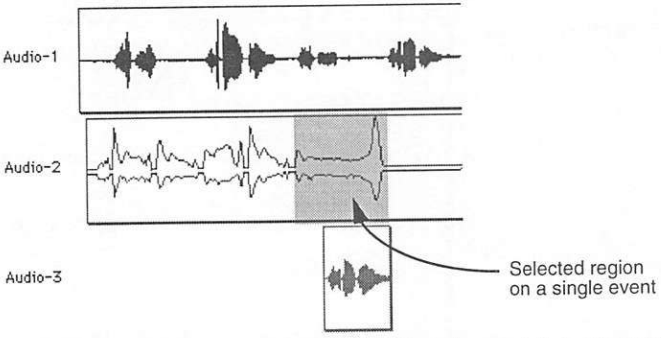


Figure 14.22: Select Events on Specific Audio Instruments Using the Marquee

Selecting all Events on Specific Audio Instruments

You can also select all events on specific Audio Instruments. The selection begins at bar one and extends to the end of the track.

1. **Move the cursor into the left margin of the Graphic window so it becomes a horizontal I-Beam.**
2. **Click to select the Audio Instrument next to the horizontal I-Beam cursor.**

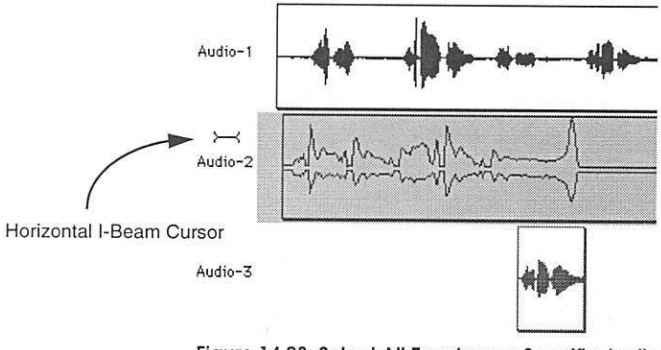


Figure 14.23: Select All Events on a Specific Audio Instrument

To select events on multiple Audio Instruments, drag the I-Beam cursor across them.

Simultaneously Selecting Notes, Audio, and Strip Chart Events

To simultaneously select MIDI notes, audio events, and Strip Chart information:

1. **Select the I-Beam cursor by clicking its icon.**
2. **Press and hold the mouse in the ruler area in the upper portion of the Graphic window (where the bar numbers are displayed) and drag across the time range you want to select.**

   All events in the vertical path that you drag over will be selected.

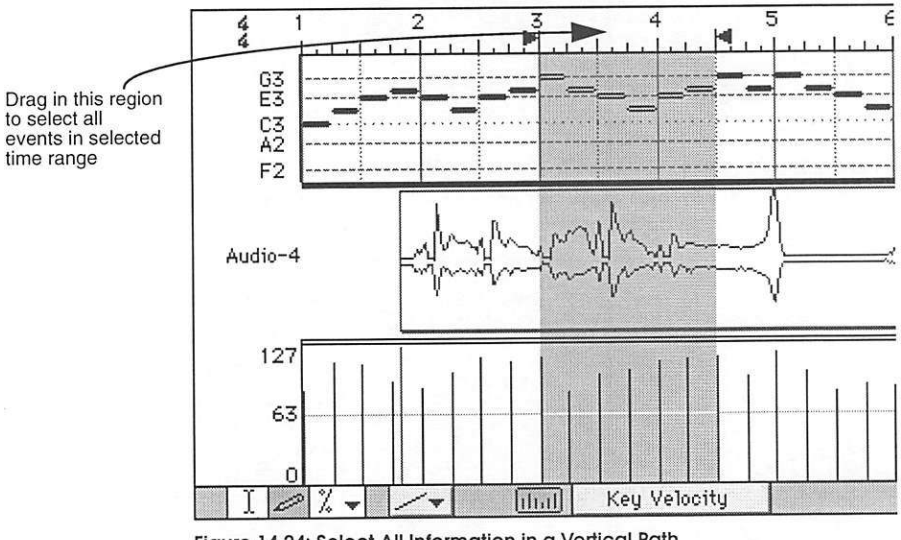


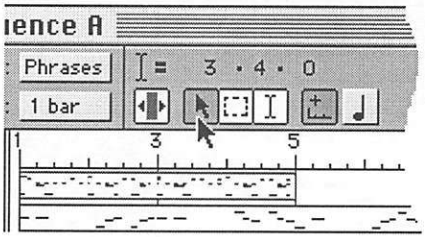
Figure 14.24: Select All Information in a Vertical Path

NOTE: As with MIDI data, you can constrain cursor movement to specific metric amounts by quantizing the cursor movements.

Simultaneously Selecting Events in Multiple Tracks

You can use many of the previously discussed techniques to select audio events in the Tracks window. The Tracks window is especially useful when you wish to select events in multiple tracks. To do so:

1. **In the Tracks window, select the Arrow cursor.**



2. **In the Track Overview, shift-click the desired audio events or phrases to select them.**

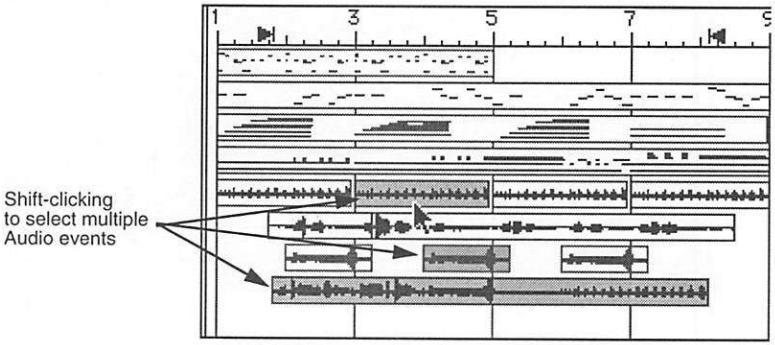


Figure 14.25: Shift-Click Multiple Audio Events

As discussed previously, if a track contains multiple Instruments, then the Track Overview area merges all Instruments in a common time range together into a single phrase. This is discussed in detail in "Audio Events and Track Overview" on page 123.

You can use the Tracks window and the I-Beam tool to select all events (of all types) in all tracks in a specified time range, and you can use the Marquee tool to select ranges of multiple events in multiple tracks.

❑ Moving Audio Events

Moving Events to New Start Times

You can move audio events to new start times using the List window numerical or by dragging events in the Graphic or Tracks windows.

To move audio events in a Graphic window:

1. **Move the cursor into the upper select region in the left side of the event.**
   The cursor turns into a Horizontal Move cursor.

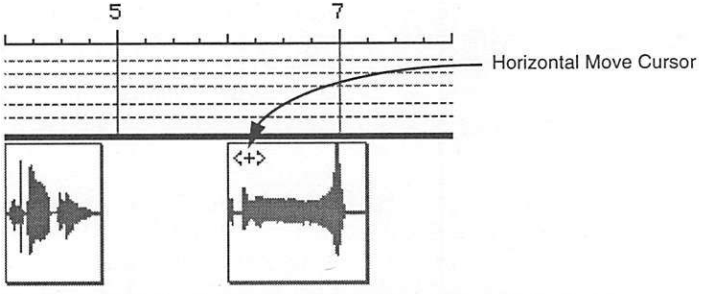


Figure 14.26: Horizontal Move Cursor Positioned over Audio Event

2. **Drag the event horizontally (left or right) to a new start time.**

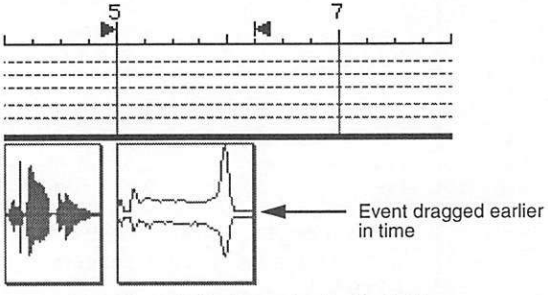
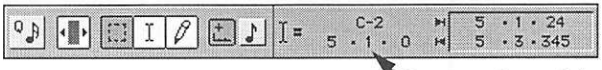


Figure 14.27: Event After Dragging Earlier in Time

As you drag, the new start time will be displayed in the Cursor Information field in the upper section of the Graphic window.



Cursor Information Field

3. **Play back the track to hear the result of your edit.**

You can use a similar technique in the Tracks window. Simply drag an event with the Arrow cursor to change its start time.

NOTE: As with MIDI data, you can constrain cursor movement to specific metric amounts by quantizing the cursor movements. For example, if you wanted to move an audio event exactly three measures earlier, you would quantize the cursor movement to whole notes, then drag the audio event three measures to the left.

To change the start time of audio events in the List window, click the event's start time (bar, beat, unit, or SMPTE) and use the numerical to scroll the values up or down (or type in the desired location).

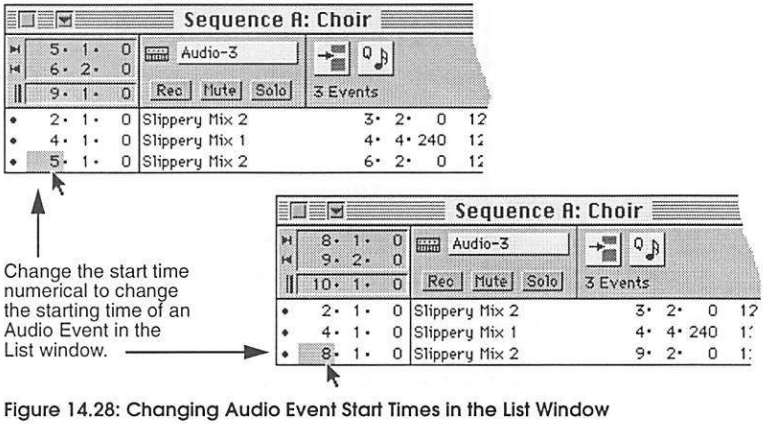


Figure 14.28: Changing Audio Event Start Times in the List Window

Moving Events to Other Audio Instruments

If another Audio Instrument already exists, you can drag audio events up or down to change their Audio Instrument assignment.

1. **Move the cursor into the center of the event's upper select region.**
   The cursor becomes a Vertical Move cursor.

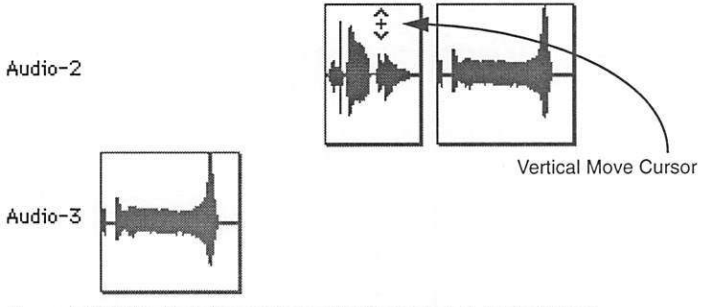


Figure 14.29: Vertical Move Cursor Positioned over Audio Event

2. **Drag the event up or down to the desired Audio Instrument.**

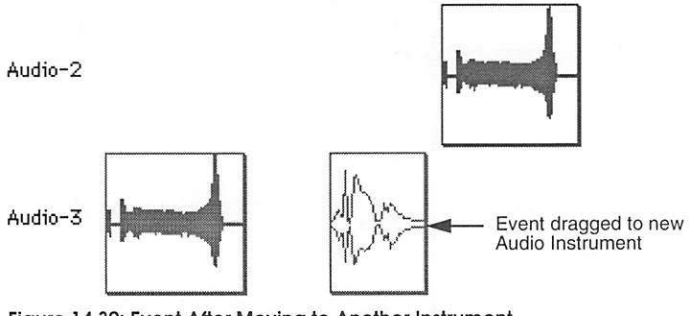


Figure 14.30: Event After Moving to Another Instrument

NOTE: If a track only contains Audio Events on a single Instrument, then the Vertical Move cursor will have no affect since there is no other Instrument to move it to. In this case, use the **Do>Set Instrument** command to change an Audio Event's Instrument assignment. See "Chapter 15: Working with Audio Instruments" for more information.

Overlapping Events

You can drag events on top of other events if you want to, but you will not be able to hear the overlapping portion of both audio events simultaneously.

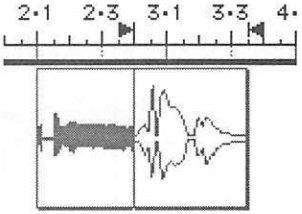


Figure 14.31: Overlapping an Event

You'll hear the event with the earlier start time until the Counter reaches the next event's start time. The overlapped portion of the previous event will not play back.

The overlapped event is not deleted—it's still there, and you can view and move it in its entirety by clicking anywhere in its upper select region.

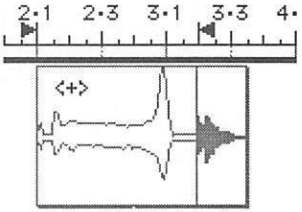


Figure 14.32: Viewing the Overlapped Event

If you want events that overlap in the same time range to play back simultaneously, you need to assign them to different Audio Instruments. Audio Instruments are discussed in detail in "Chapter 15: Working with Audio Instruments".

Viewing Your Play State

You can easily see your play state by clicking outside of an Audio Event. This un-highlights the event and shows you which events are on top of other events and, consequently, which portions of which events will play.

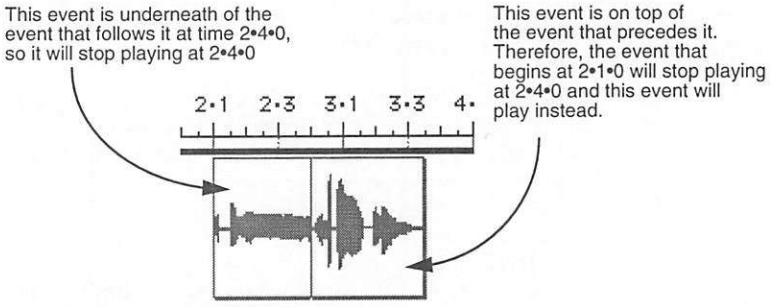


Figure 14.33: Viewing Your Play State

❑ Changing Audio Event Lengths

Audio Events and Track Length

If the beginning of an audio event falls within the track length, but any portion of it falls beyond the end of the track, that portion will not be played by Studio Vision. If the track loops, then the portion of the audio event that's past the end of the sequence will play.

As with MIDI data, if you check the **Sustain Notes across Subsequences** options in the Preferences dialog box, an audio event that's part of a subsequence will continue to play after its parent sequence has ended. See your Vision Reference Manual for more information about the **Sustain Notes across Subsequences** option.

In order to always hear the entire event, you need to manually adjust the track length to accommodate its end point, just like you need to adjust the track length to accommodate MIDI note events that extend beyond the end of the track. Use a track length numerical in any window to change a track length.

Trimming or Lengthening Audio Events

You can trim or lengthen audio events by simply dragging inward from the side you want to trim or outward from the side you want to lengthen.

The remainder of the audio event you trim, or the increased portion of the event you lengthen, remains at the event's original location in time relative to other audio events and MIDI data in the track.

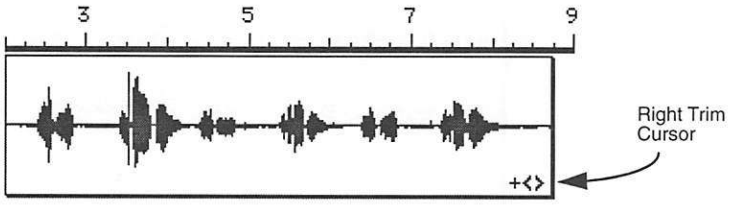
You cannot lengthen audio events beyond their original lengths (as determined by recording, mixing, or importing). For example, if the original audio event was two bars long, trimmed audio events that derive from that original event cannot be lengthened beyond two bars.

HINT: If you have recorded multiple takes into a single audio file and you wish to extend an event beyond the limits of the original take, simply import the *entire* audio file into Studio Vision.

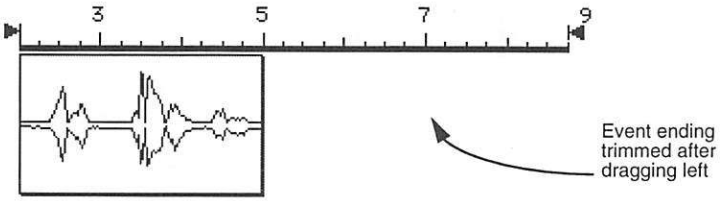
Trimming

To trim the right edge of an audio event:

1. **Move the cursor into the upper or lower right corner of the audio event.**
   The cursor turns into a Right Trim Cursor.

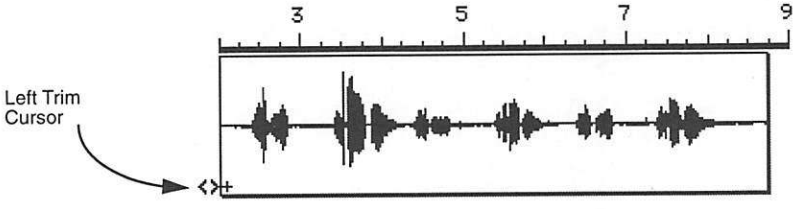


2. **Drag the mouse to the left.**
   Studio Vision trims off the ending of the audio event.

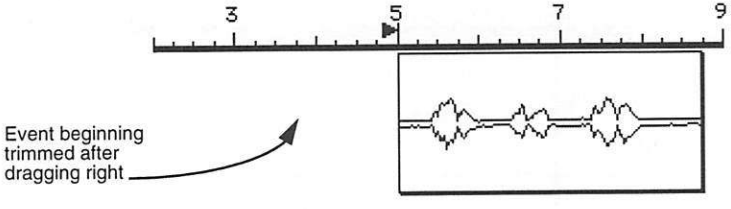


To trim the left edge of an audio event:

1. **Move the cursor into the lower left corner of the audio event.**
   The cursor turns into a Left Trim Cursor.



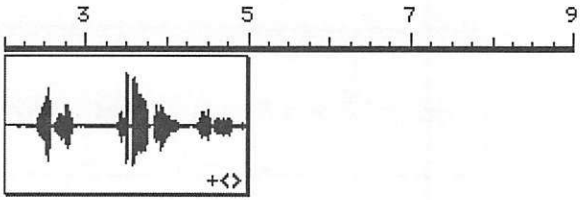
2. **Drag the mouse to the right.**
   Studio Vision trims off the beginning of the audio event.



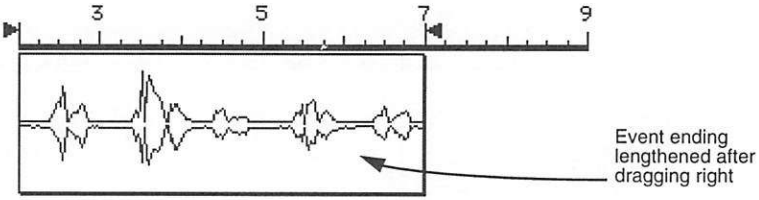
Lengthening

To lengthen an event:

1. **Move the cursor over the lower left corner or either right corner of the event.**



2. **Drag outward from the event to lengthen it.**



❑ Cutting, Copying, and Pasting Audio Events

You can cut, copy, and paste audio events (or portions of events) in much the same way as MIDI data. For more information about these procedures, see "Cut" on page 221 or "Copy & Paste" on page 222.

❑ Retaining and Separating Audio Events

Studio Vision offers two other useful commands to help you remove and separate portions of audio events. These are:

- **Audio>Retain**: When you choose this command, Studio Vision retains only the audio in the selected region and clears all audio data comprising the rest of the selected audio event(s). For more information, see "Retain" on page 232.
- **Audio>Separate**: When you choose this command, Studio Vision separates the selected region from the existing audio event and creates a new audio event from it. For more information, see "Separate" on page 233.

CHAPTER 15: Working with Audio Instruments

❑ Definition of an Audio Instrument

An Audio Instrument is analogous to a Vision Instrument, which maps groups of MIDI events to a MIDI device and channel.

Audio Instruments allow you to recognize related audio events, to associate controller data with specific events, to assign different audio channels to particular events so that multiple events in the same track can sound simultaneously, and to associate events with particular outputs. For instance, all vocals might be assigned to one Audio Instrument, and all bass guitar audio events might be assigned to another. You would be able to simultaneously play back a vocal audio event and a bass line event, since Audio Instruments are assigned to their own audio channels.

You would also be able to control the pan and volume values of all events on one Instrument independently of events on any other Instrument, and you would be able to easily identify where all events on a particular Instrument occur just by looking at a List or Graphic window.

If you have a color monitor, you can assign a different color to each Audio Instrument.

When you set up Studio Vision to record, you chose an Audio Instrument to be assigned to the recorded events. You'll see this Audio Instrument displayed in the Tracks window in the Instrument column on the audio track you recorded.

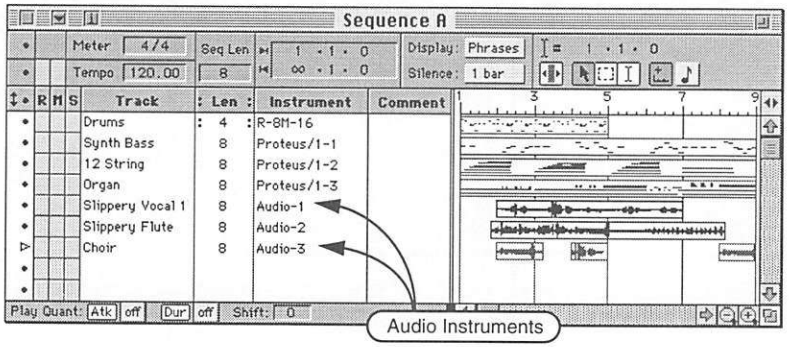


Figure 15.1: Audio Instrument in the Tracks Window

❑ Setting Up Audio Instruments

The following sections discuss how to name Audio Instruments, set their colors, mute them and solo them.

Naming Audio Instruments

You can name Audio Instruments (for instance "vocals" or "bass") to easily identify audio events assigned to those Instruments. To do so:

1. **Choose Windows>Audio Instruments.**

   Studio Vision opens the Audio Instruments window.

   NOTE: The **Outputs** section of your Audio Instruments window may look different depending on which audio hardware you're using. Also, if your hardware supports only a single output channel, the Audio Instruments window will not show the **Poly** or **Outputs** columns.

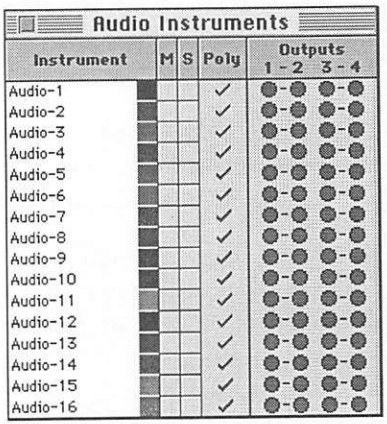
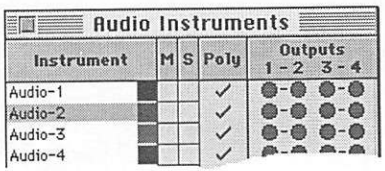
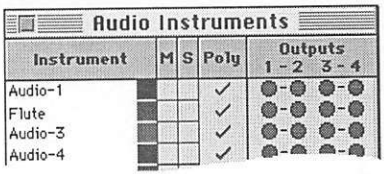


Figure 15.2: Typical Audio Instruments Window

2. **Click the name of the Audio Instrument you wish to change.**



3. **Type a new name for the Audio Instrument.**



Use the Audio Instruments window to name up to 16 Instruments; Instrument names that are displayed in other windows and dialog boxes will update to reflect the new name.

TIP: If a track contains only audio data, you can open the Audio Instruments window directly from either the List or Graphic window by double clicking the Instruments icon ( ).

Setting Audio Instrument Colors

If you have a Macintosh with a color monitor, you can display different Audio Instruments in different colors. To do so:

1. **Choose Windows>Audio Instruments.**
   Studio Vision opens the Audio Instruments window.
2. **Press and hold the mouse in the Color column (located immediately to the right of the Audio Instrument's name).**
   Studio Vision opens a color selection pop-up menu.
   NOTE: You will only see a Color column if you have a color monitor.
3. **Select the desired color from the pop-up menu.**

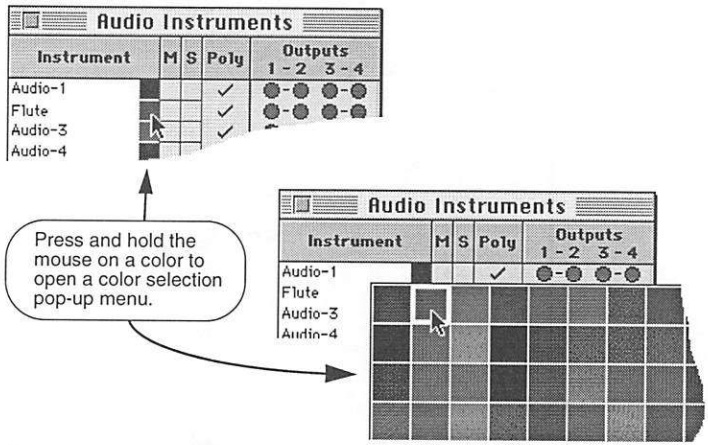


Figure 15.3: Setting an Audio Instrument's Color

You can change the colors available in the color selection pop-up menu. To do so:

1. **Choose Setups>Colors.**
   Studio Vision opens a dialog box containing all defined colors.
2. **Click the color you wish to change.**
   Studio Vision opens a standard Macintosh color picker dialog box.
3. **Pick a new color and click the OK button.**
4. **Change other colors as desired, then click the OK button to close the Colors dialog box.**

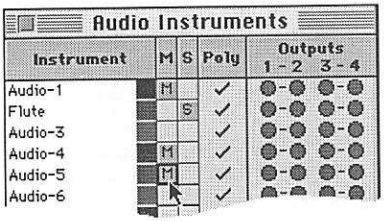
You can reset any modified colors to Opcode's default colors. To do so:

1. **Choose Windows>Instruments.**
   Studio Vision opens the MIDI Instruments window.
2. **Choose Initialize Colors from the Instruments window menu.**
   Studio Vision resets its colors to their default values.

Muting or Soloing an Audio Instrument

To mute or solo an Audio Instrument:

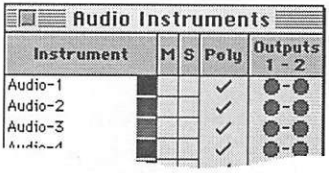
1. **Click the Mute or Solo column next to the desired Audio Instrument.**
   This places an "M" or "S" in the column to indicate whether the Audio Instrument is muted or soloed.
   Soloing occurs across all Instruments, both MIDI Instruments and Audio Instruments. Soloing an Audio Instrument mutes all unsoloed Audio and MIDI Instruments.



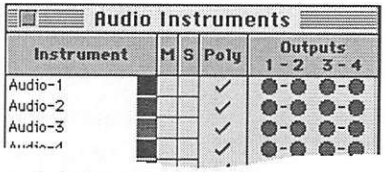
2. **Click again to disable an Audio Instrument's mute or solo.**

❑ Set Hardware Outputs for Audio Channels

The Audio Instruments window has an output column for each audio output channel available with your audio hardware. For example, many Macintosh models with built-in audio contain only two output channels (a stereo pair); a single Sound Accelerator II card has four output channels; two Pro Tools cards have eight output channels, etc.



Audio Instruments window for a two output system (such as a Macintosh with stereo outputs).



Audio Instruments window for a four output system (such as a single Digidesign Pro Tools card).

Figure 15.4: Different Numbers of Audio Channel Outputs

NOTE: If your hardware supports only a single output channel, the Audio Instruments window will not show the **Poly** or **Outputs** columns.

Each audio output column corresponds to a physical output on your audio playback hardware.

By default, Studio Vision assigns all Audio Instruments to all outputs. You should assign Audio Instruments only to the outputs where you want to hear them. Basically, you'll assign each mono Audio Instrument to a single output or each stereo Instrument to a pair of outputs.

NOTE TO PRO TOOLS USERS:

If you're using multiple Pro Tools cards and a system accelerator, you will see outputs displayed in groups of four (each group represents a 4-channel Pro Tools system).

If you have an 8-track Pro Tools system, an Audio Instrument can only be assigned to outputs that are in the same group of four. For example, if Audio-1 is assigned to Output 1, it can also be assigned to Output 2, Output 3, and Output 4. It cannot be assigned to Outputs 5 through 8.

If you have a 12-track or 16-track Pro Tools system, then an Audio Instrument can only be assigned to outputs that are part of the same pair. For example, If Audio-1 is assigned to Output 5, it can also be assigned to Output 6; it can not be assigned to any other output without disabling Output 5.

If, in an 8+ track system, you enable an output for an Audio Instrument that's currently assigned to a different output grouping, Studio Vision will automatically disable any output assignments in that original grouping.

To assign the Audio Instruments to outputs:

1. **Choose Windows>Audio Instruments.**

   Studio Vision opens the Audio Instruments window.

2. **Enable or disable Outputs for each Audio Instrument by clicking the desired Output dots.**

   A disabled Output has an empty Output dot. An enabled Output has a highlighted dot (green on a color monitor).

For example, a common output assignment for non-stereo Audio Instruments might look as follows:

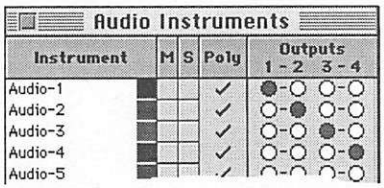


Figure 15.5: Mono Audio Instruments

Stereo Events might be assigned to Audio Instruments as shown below (where odd Outputs correspond to left channels and even Outputs correspond to right).

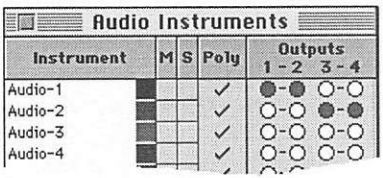


Figure 15.6: Stereo Audio Instruments

If a mono Instrument is assigned to only Output 1, its panning information will be ignored and it will always appear at Output 1. However, if it's assigned to the 1-2 Output pair, it will appear at outputs 1 or 2 or both, depending on the current panning information.

Clicking in an Output button toggles its state. Clicking in between stereo pairs toggles both buttons. Clicking in the column heading toggles the entire Output column.

Poly Mode

When an Audio Instrument's **Poly** column is checked, that Audio Instrument is capable of playing the maximum number of simultaneous events supported by your audio hardware. For example, with a Sound Tools II card, Studio Vision can play four audio events simultaneously, provided they are on separate tracks—even if all four of these events are assigned to the same Audio Instrument.

If you uncheck the **Poly** column next to an Audio Instrument, you disable that Instrument's ability to play simultaneous audio events—only one event can possibly play at once even if they're on separate tracks.

❑ Multiple Audio Events In the Same Track

If multiple events in the same track are assigned to the same Audio Instrument, playback defaults to the event with the later start time. So, for example if you have two events that overlap within the same time range, you'll hear the first event sound, then when the Counter reaches the start time of the second event, the first event will be silenced and the second event will sound.

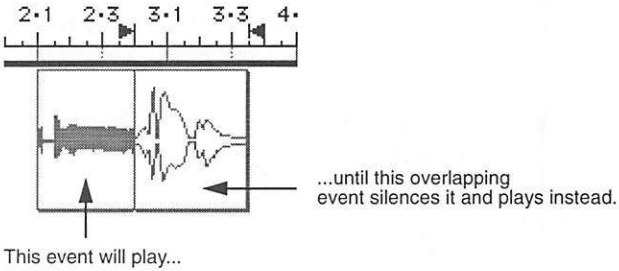


Figure 15.7: The Event with the Later Start Time Has Playback Precedence When Multiple Events on the Same Instrument Overlap in the Same Track

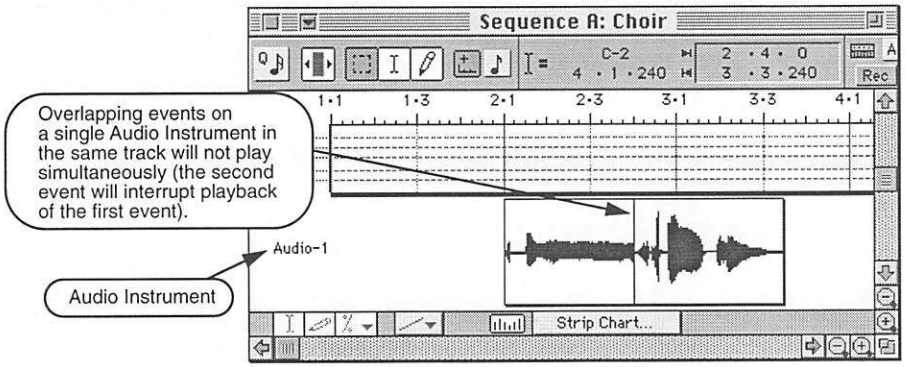
NOTE: This situation occurs only if you have overlapping Audio Events assigned to the *same Audio Instrument* in the *same track*. If the same two overlapping Audio Events are in separate tracks, they will both play back unless you disable Poly mode (as discussed in "Poly Mode" on page 148).

If you assign each Audio Event in a track to a different Audio Instrument, all events will sound simultaneously even if they're in the same time range. Your audio hardware determines the maximum number of audio events that can play simultaneously.

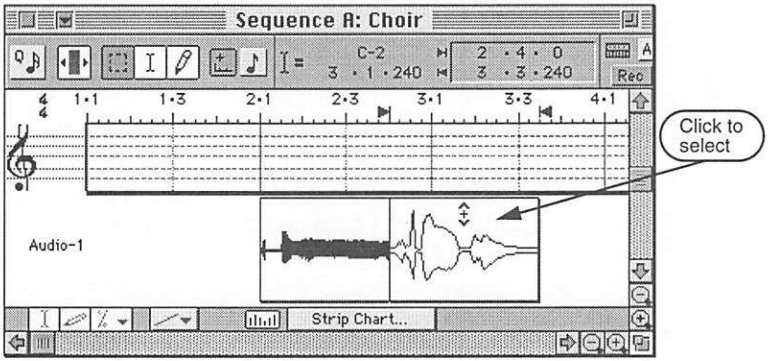
Changing Audio Instrument Assignments in a Graphic Window

To assign an Audio Event to a different Audio Instrument:

1. **Open the Graphic window to display your audio track.**



2. **Click the audio event that you want to sound in the same time range as another audio event.**



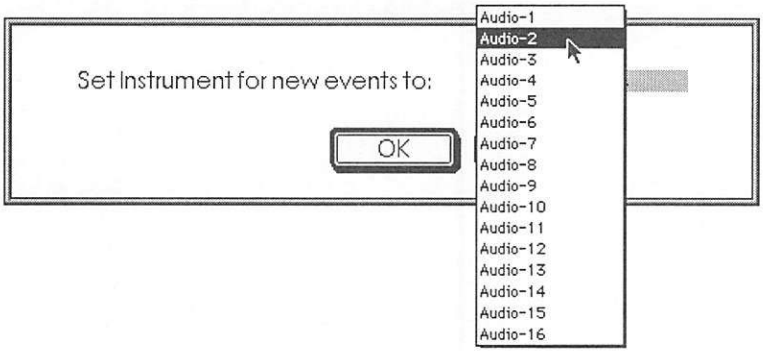
3. **Choose Do>Set Instrument.**

   Studio Vision opens the Set Instrument dialog box.

4. **Press and hold the mouse on the name of the Audio Instrument.**

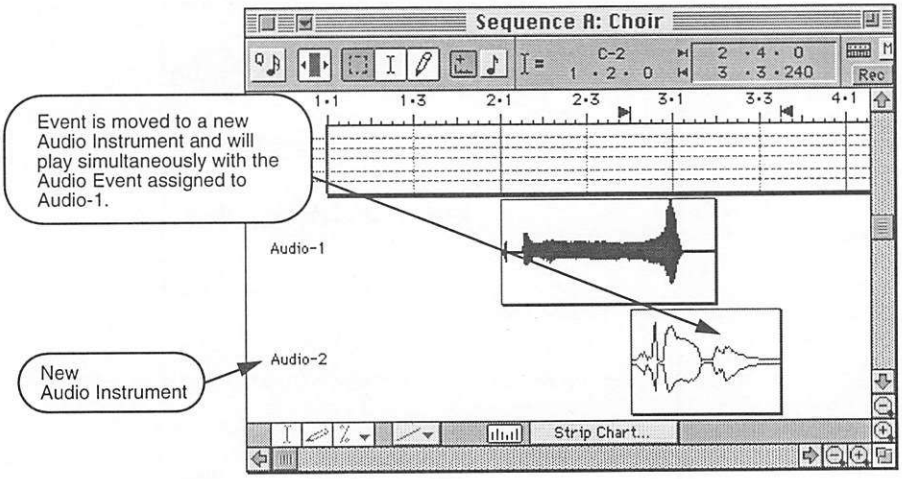
   Studio Vision opens a pop-up menu of Instrument choices.

5. **Select a new Audio Instrument from the pop-up menu.**



6. **Click the OK button.**

   Notice that setting an event to a different Audio Instrument creates a new Audio Instrument in the Graphic window (if it didn't already exist) and assigns the selected event to that Instrument.



Now, when you play back the track, you'll hear both events in their entirety—even those portions that occur in the same time range.

NOTE: If you open a List window for this track, you'll notice that it now displays an Audio Instruments column, so you can see which Instrument individual events are on.

Dragging Events to Different Audio Instruments

Now that you have multiple Audio Instruments assigned to one track, you have multiple Audio Instruments in the Graphic window. To assign audio events to different existing Audio Instruments, you can simply drag them to the desired Audio Instrument.

To drag events to another Audio Instrument:

1. **Click in the center of the upper select region so the cursor turns into a vertical move cursor.**

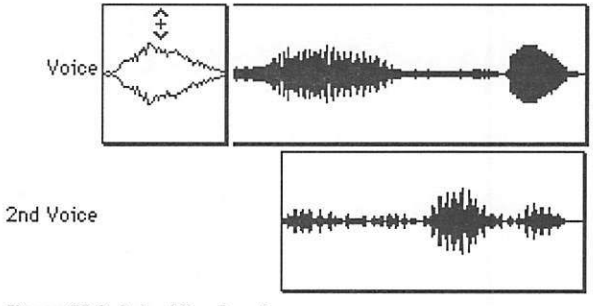


Figure 15.8: Select the Event

2. **Drag the event up or down to a new Audio Instrument.**

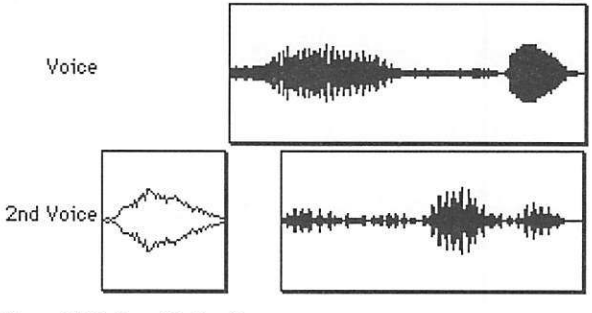
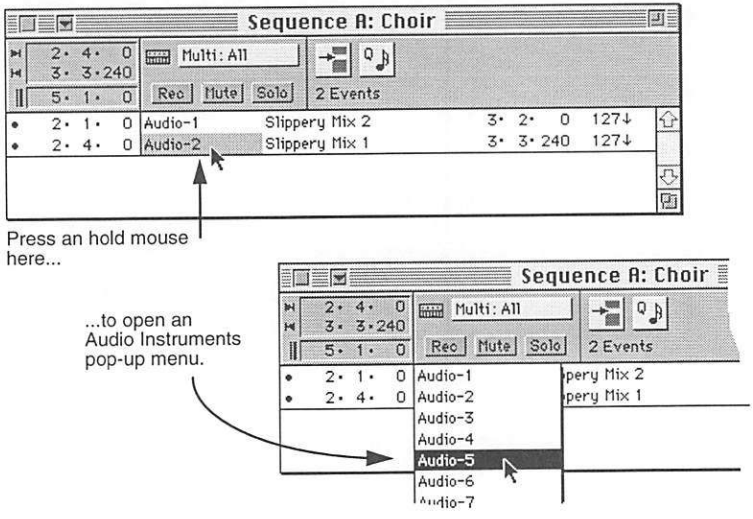


Figure 15.9: Drag Vertically

Changing Audio Instrument Assignments in the List Window

When you have more than one Audio Instrument assigned to a track, the List window displays a new column—the Audio Instruments column. You can use this column to assign individual events to Audio Instruments, if you want, rather than dragging the event or using **Do>Set Instrument**.

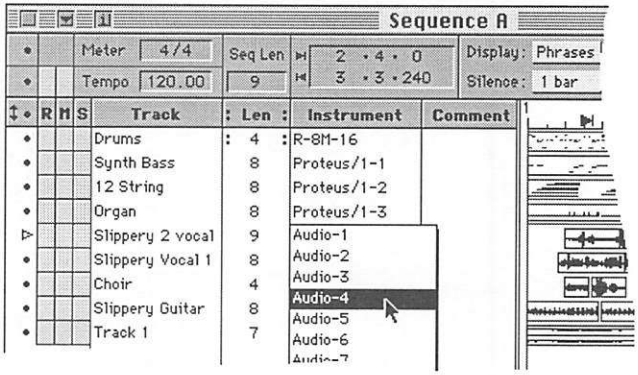
1. **Press and hold the mouse on an Instrument name in the List window.**
   Studio Vision opens a pop-up menu of all 16 Audio Instruments.
2. **From the pop-up menu, select the Instrument that you want to reassign a particular audio event to.**



Changing Audio Instrument Assignments in the Tracks Window

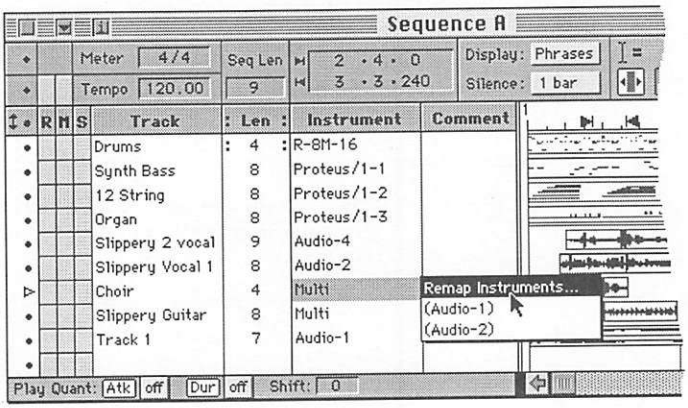
If a track only has one Audio Instrument in it and you want to change that Instrument, you can do this from the Tracks window:

1. **Press and hold the mouse on the Audio Instrument name.**
   Studio Vision opens a pop-up Instruments menu listing all 16 Audio Instruments.
2. **From the pop-up menu, choose the Audio Instrument to which you want to reassign all Audio Events in that track.**



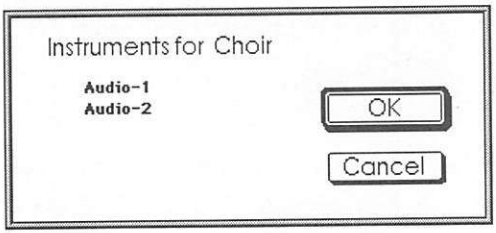
When you have more than one Audio Instrument assigned to a track, the Tracks window displays the track's Instrument assignment as "Multi". You can remap all Audio Events assigned to one Instrument to a different Audio Instrument for that track. To do so:

1. **Press and hold the mouse in the Instrument column for the desired track.**
   Studio Vision opens a pop-up list of Instruments assigned to that track. This list also contains a **Remap Instruments** command.



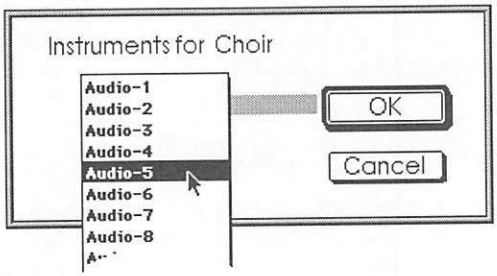
2. **Select Remap Instruments from the pop-up menu.**

   Studio Vision opens the Remap Instruments dialog box. This dialog box lists all Instruments currently in use by the Track.



3. **Press and hold the mouse on the name of the Instrument you wish to reassign.**

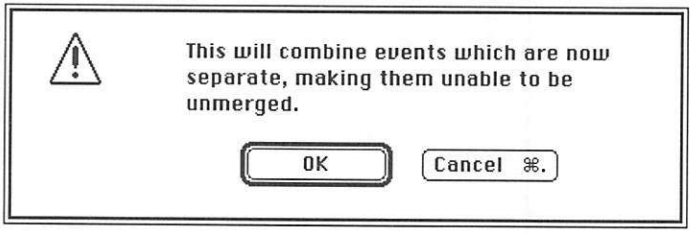
   Studio Vision opens a pop-up menu of Instrument choices.



4. **Select a new Instrument assignment from the pop-up menu.**

Merging Audio Instruments

To set all events in a track to the same Instrument, choose the same Audio Instrument for all Instruments displayed in the Remap Instruments dialog box. When you click **OK**, you'll see a warning dialog box.



If you click **OK**, in order to hear multiple events in the same time range, you will have to manually select individual events all over again and set them to new Instruments using the Set Instrument dialog box.

If you merge one Audio Instrument with another, Studio Vision won't be able to simultaneously play audio events that occur in the same time range, since all events will be assigned to one Audio Instrument.

IMPORTANT: This operation cannot be undone.

❑ Saving Instrument Setups

Audio Instruments are saved with sequence files along with MIDI Instruments. You may also save Audio Instruments in the Vision Setup file by using the **File>Save as Setup** command. See your Vision Reference manual for more information about the Setup file.

Opening Files in Vision and Studio Vision

If no sequences in a file contain any Audio Instruments (that is, there are no audio events or audio controller events), the file will be saved as a Vision file and can be opened in either Vision or Studio Vision. If any audio or audio controller events are in any sequence, the file can only be opened by Studio Vision.

CHAPTER 16: Adjusting Volume and Pan

You can adjust the volume and pan settings for audio in many different ways:

- Use the List window to insert volume or pan controller events at specified times, or...
- Use the Strip Chart to draw controller events over time, or...
- Use the Faders window to record volume and pan fader events.

❑ The Difference Between Velocity and Volume

Like MIDI, audio *volume controller events* affect all Audio Events that are on the same Audio Instrument as the controller. The *velocity* of an audio event affects the volume for just that event. There are different ways you can take advantage of these distinctions.

- Use velocity to set a static output level for each event.
- Use MIDI controller #7 (volume) to vary the volume level of an Audio Event over time.
- Use velocity and MIDI controller #7 together to create a combination of static and dynamic mixes. For example, assume you have a track of drum Audio Events, all assigned to the same Audio Instrument. You can set a velocity for each drum event to create the accenting you want. Then you could use the Instrument's volume (controlled by a fader) as a global level control for the drum events.

Setting an Individual Audio Event Level ("Velocity")

To adjust the volume of individual audio events, open a List window and drag each audio event's Velocity numerical to the desired value.

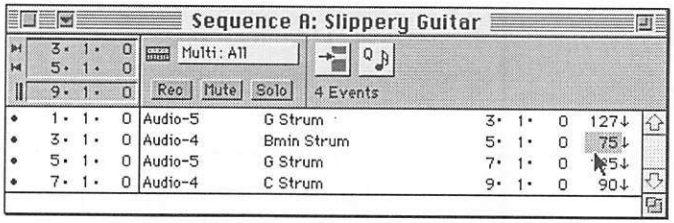


Figure 16.1: Individual Audio Event Velocity in the List Window

If you like, you could also adjust audio event velocities in the Graphic window's strip chart.

Setting Volume and Pan Levels

You can also adjust the overall volume and pan of multiple audio events by assigning controller events to specific Audio Instruments; all audio events on those Instruments will be affected by adjustments to the controller.

Inserting Individual Controller Events in the List Window

You can insert controller events in your track, and specify an Audio Instrument that the controller is to be associated with. All audio events on that Instrument will respond to that controller. Any subsequent controller settings that you enter will take precedence over previous ones.

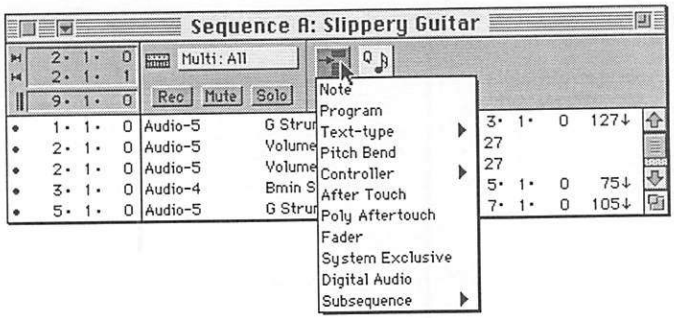
To insert a controller event:

1. **Set the time where you want the event to be entered by using the start and end time numericals in the upper left of the List window.**

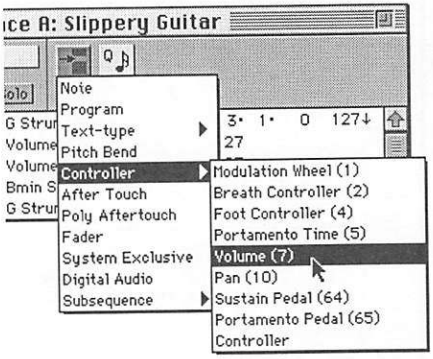
   Alternately, you could click the selector dot of an existing event if you want the controller to be entered at that time too.

2. **Press and hold the mouse on the Insert icon in the upper portion of the List window.**

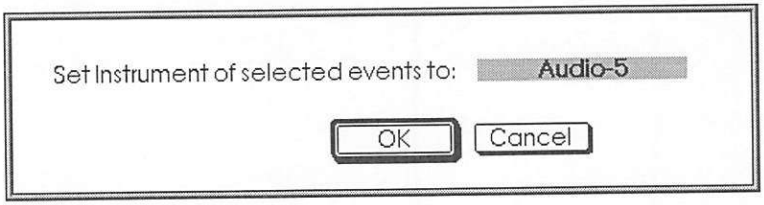
   Studio Vision opens a pop-up menu of data types.



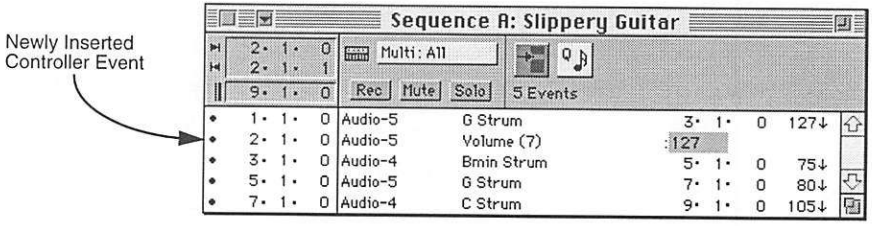
3. **From the pop-up menu, select either volume or pan from the Controller submenu.**



If this track contains multiple instruments and it's the first controller event you've entered into it, you'll see a Set Instrument dialog box asking you to assign it to an Instrument. If this is the case, select an Instrument from the dialog box and click the **OK** button.

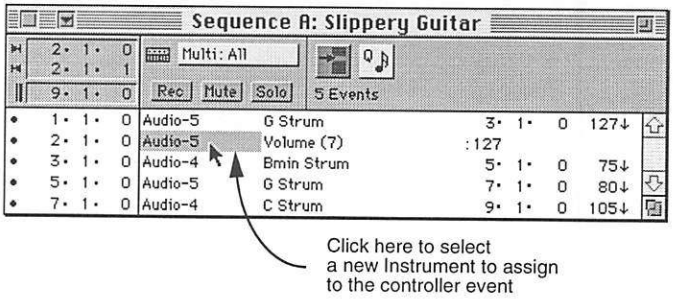


If you already have a controller in your track, the new controller event will automatically be set to the Instrument that controller is set to.



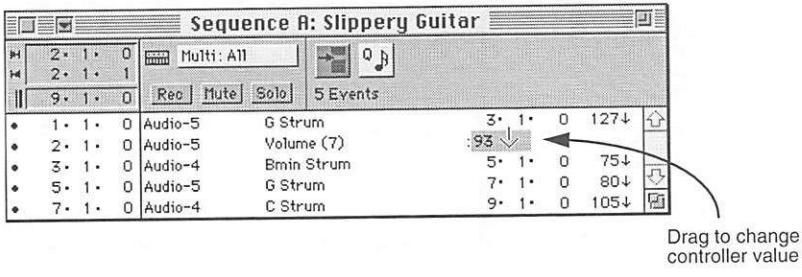
Changing Controller Event Instrument Assignments

If, after inserting a controller event, you wish to change its Instrument assignment, simply press and hold the mouse in the event's Instrument column and select a new Instrument from the pop-up menu.



Changing Controller Event Values

After inserting a controller event, you can adjust its value by dragging the numerical, which is to the right of the controller name.



Drawing Controller Events

You can also enter controller events in the Graphic window's Strip Chart by using the Pencil tool to draw information that changes over time and affects multiple events. To do so:

1. **Choose either volume or pan from the Strip Chart.**

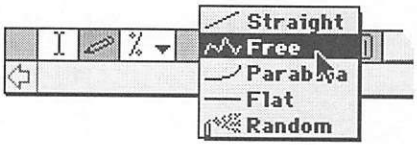
   Volume is displayed in a range of 0 to 127.

   Pan is displayed with pan center at zero, pan left below zero, and pan right above zero. The farther you draw data from pan center the farther left or right you'll pan the data.

   IMPORTANT: To avoid overloading the computer, make sure your audio volume and pan controllers have a low density—as low as possible without hearing steps. For details about setting controller density in the Strip Chart, see your Vision Reference Manual.

2. **Click the Pencil icon in the lower left of the Strip Chart to turn the cursor into the Pencil tool.**

3. **Choose an operation type from the pop-up menu in the lower left of the Strip Chart.**



4. **Drag through the Strip Chart to draw controller events that change throughout time.**

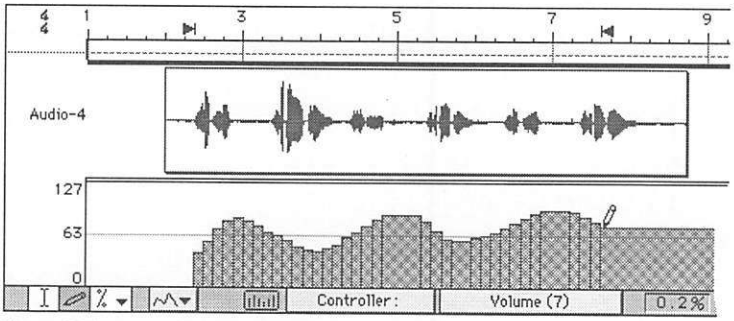


Figure 16.2: Draw Controller Events

If this track contains multiple instruments and it's the first controller event you've entered into it, you'll see a Set Instrument dialog box asking you to assign the new controller events to an Instrument. If this is the case, select an Instrument from the dialog box and click the **OK** button. Thereafter when you draw data it will automatically get set to the Instrument initially named.

If you want to change the Instrument, you can use the List window's Instrument pop-up menu (as discussed in "Changing Controller Event Instrument Assignments" on page 160), or by selecting the event in the Strip Chart or the List window and choosing **Do>Set Instrument**.

The controller data you draw is also displayed in the List window.

Using Volume and Pan Fader Events

You can control audio volume and pan in real time by associating them with Faders, which, in turn, you assign to Audio Instruments.

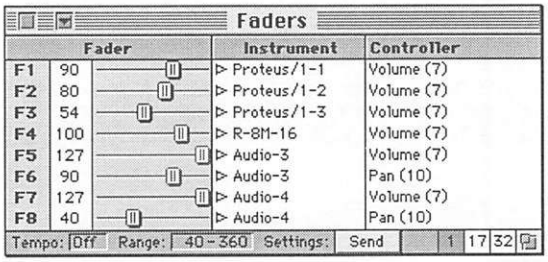


Figure 16.3: Typical Faders Window

You can adjust audio volume and pan levels using the fader knobs, your synthesizer, or a remote device. Fader movements are recorded as fader events. Your Vision Reference Manual contains a complete description of how to use faders. The following sections discuss those areas that apply specifically to digital audio.

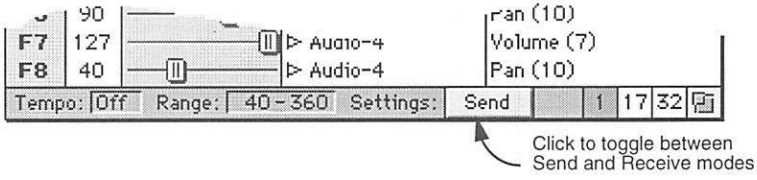
Mapping Volume and Pan to Faders

The Faders window is comparable to a programmable mixer that remembers your controller settings for each sequence. It enables you to perform real-time mixdowns, editing audio volume and pan as you listen to the sequence playing back.

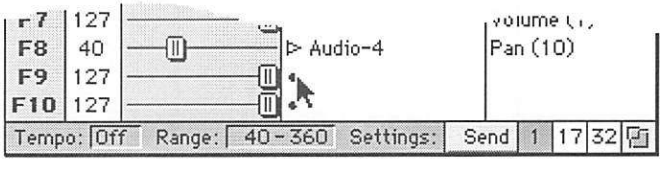
The Faders window also enables you to map an external MIDI device, which transmits controller information, to specific faders assigned to controllers. This is helpful if you're mixing down multiple Audio Instruments using an external hardware MIDI Fader device.

To assign a controller event to a fader:

1. **Choose Windows>Faders.**
   Studio Vision opens the Faders window.
2. **Make sure the Fader window is set to Send mode.**

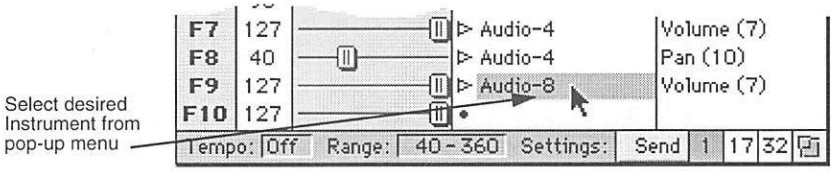


3. **Click the selector dot of a fader you want to assign to an Audio Instrument.**

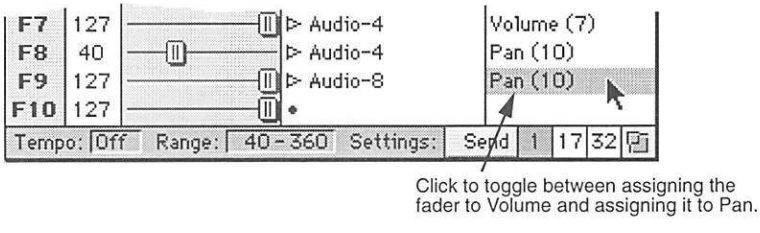


By default, Studio Vision assigns the correspondingly numbered Instrument to the fader. It also assigns a Volume controller to the fader. To change these settings...

4. **Press and hold the mouse on the Instrument name and select the desired Audio Instrument from the pop-up Instrument menu.**



5. **Click the controller name to toggle back and forth between volume and pan.**



To record volume or pan events as you listen to your track:

1. **Record enable the track you want the fader events on.**

   Do this by clicking in the Record column of the Tracks window, placing an "R" there.

NOTE: You may want to record the fader movement onto a separate track while you're experimenting—it's easier to delete your edit, and you can mute and unmute the track to see how it sounds. It's also useful to record different mixes on different track, since you can later compare and choose between them.

---

2. **Set the desired Record mode.**

   Replace will wipe out any preexisting events and replace them with the fader events. **Overdub** merges fader events with preexisting events on the track.

3. **In the Control Bar, set a Countoff or choose Wait for Note mode.**

4. **Click the Record button.**

   If you chose **Wait for Note**, you'll have to click the Start button or press the Spacebar to begin the Counter.

   You'll hear previously recorded tracks play back as you're recording onto the record-enabled track.

5. **Drag the appropriate fader button to the left and right.**

   Studio Vision records all fader movements in the record-enabled track.

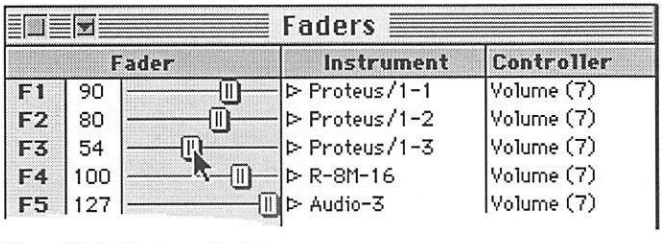


Figure 16.4: Moving a Fader

If you're altering volume, the range from 0 to 127 represents low to high amplitude. If you're altering pan, the range represents pan left from 0 to 63, 64 is center, and pan right is 65 to 127.

NOTE: For more on using the Faders window to map controllers to MIDI Instruments see your Vision Reference Manual.

❑ Additional Information for DAE Users

NOTE: These sections apply only if you're using Studio Vision with DAE. If you're using Studio Vision with Sound Manager, you can skip the following sections.

Smoothing Volume and Pan Changes (DAE Only)

Sudden changes in volume and pan can produce unwanted noise, such as clicks, pops, or "zips." If you're using Studio Vision with DAE, you can use the Audio Preferences dialog box to set parameters that will smooth out rapid changes in volume or pan, therefore eliminating these unwanted noises. For more information see "Smooth Audio Controllers" on page 256.

Pan Compatibility with Older Versions (DAE Only)

NOTE: You only need to read this section if you have Studio Vision files that were created with version 1.4 or earlier.

In Studio Vision version 1.4 and earlier, audio events panned to the center were attenuated by -6dB. More recent versions of Studio Vision let you set the center attenuation to either -6dB or -3dB (as with a standard mixing console).

Normally, you will use the default -3dB attenuation, but if you're remixing an old version 1.4 or earlier file, this default may cause your audio signals to sound louder relative to the MIDI sequences. To compensate for this, you should change the Center Pan value to -6dB, as it was in Studio Vision 1.4 and earlier.

To set the center pan value:

1. **Choose Audio>Audio Preferences.**
   Studio Vision opens the Audio Preferences dialog box.
2. **Click either the -6dB or -3dB Center Pan radio button.**

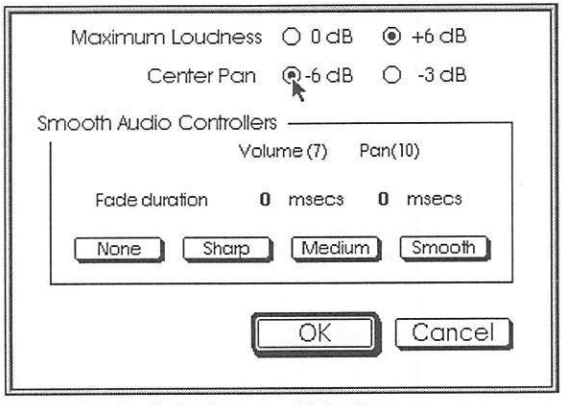


Figure 16.5: Audio Preferences Dialog Box

3. **Click the OK button.**
   Studio Vision attenuates center-panned events by 6 dB.

CHAPTER 17: Audio Scrubbing (DAE Only)

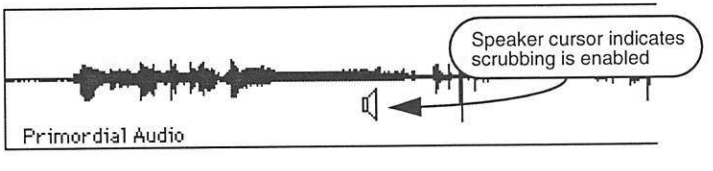
NOTE: Audio Scrubbing is possible only when using Studio Vision with DAE. If you're using Studio Vision with Sound Manager, you should skip this chapter.

❑ Audio Scrubbing in the Graphic Window

Studio Vision, when used with DAE, allows you to audibly find precise locations in an audio event by "scrubbing." By holding down the command key while dragging the mouse, Studio Vision lets you scrub the audio event either forward or backward and at varying speeds.

To use scrubbing:

1. **Move the cursor over the audio event you wish to scrub.**
2. **Press the Command key on your Macintosh.**
   The cursor changes into a speaker cursor.



3. **Press and hold the mouse, then drag to the right (to hear the event played forward) or drag to the left (to hear the event played backward).**

   The playback speed is determined by how far the speaker cursor is from the actual playback point—the further the speaker cursor is from the playback point, the faster the audio plays back. The closer the speaker cursor is to the playback point, the slower the audio plays back. Normal playback speed is obtained when the cursor is dragged about 2-3 seconds ahead of the playback point. The maximum scrubbing speed of DAE is 1.5 times the normal playback speed.

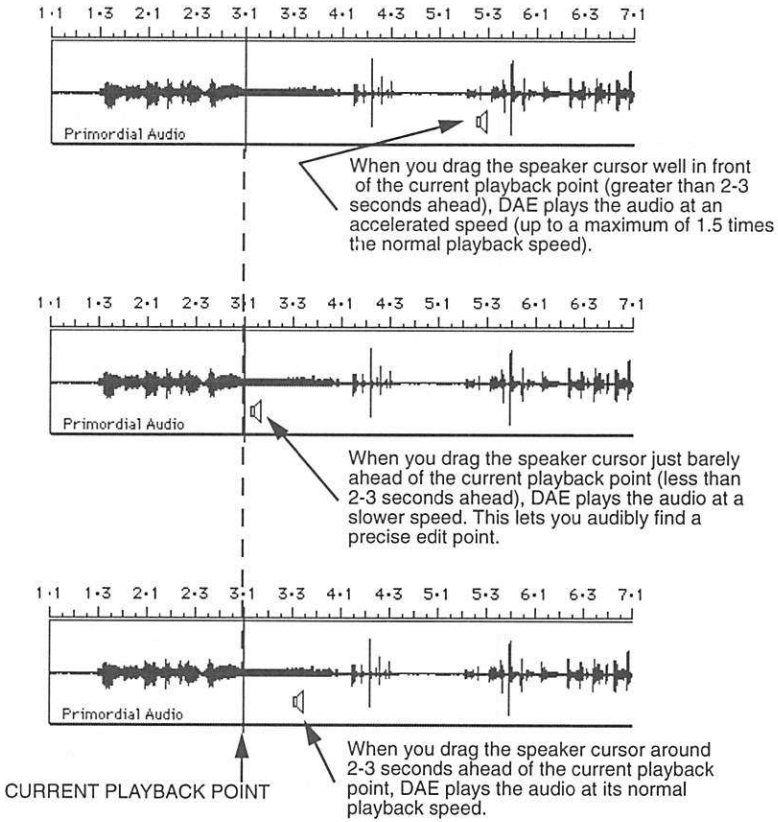


Figure 17.1: Scrubbing Speeds

NOTE: DAE allows you to scrub only one audio event at a time. In order to "skip" to another audio event, you must release the mouse button, then command-drag on the event you wish to hear.

Scrubbing and Audio Outputs

You can scrub both mono and stereo events. The playback of scrubbed audio *always* appears at Outputs 1 & 2 of your DAE audio hardware *no matter what output the event's Audio Instrument is assigned to.*

For example, if you're scrubbing an event that's assigned to an Audio Instrument that uses Output #4, the scrubbed audio will be sent to Outputs 1 & 2. When you play the audio event normally (that is, any way other than scrubbing), the audio will be sent to Output #4.

NOTE: This is the same output re-assignment that occurs when you audition audio from the Import dialog box.

Scrubbing and Output Volume

Scrubbed audio always plays at the maximum output level. This is either 0dB or +6dB depending on your choice in the Preferences dialog box (see "Maximum Loudness" on page 256). Scrubbing ignores both the velocity of the event and any associated MIDI volume commands.

❑ Audio Scrubbing in the Track Overview Area

You can scrub audio in the Tracks window's Track Overview area in much the same way as in the Graphic window. To do so:

1. **In the Track Overview area, move the cursor over the audio event you wish to scrub.**
2. **Press the Command key on your Macintosh.**
   The cursor changes into a speaker cursor (🔈)
3. **Press and hold the mouse, then drag to the right (to hear the event played forward) or drag to the left (to hear the event played backward).**

There are a few additional rules you need to be aware of when scrubbing in a Tracks window:

- If you scrub over a phrase that contains only MIDI events, Studio Vision plays all the MIDI events in all the tracks. No audio events will play.
- If you scrub over a phrase that contains only a single audio event, Studio Vision plays back that audio event. No MIDI events will play.

- If you scrub over a phrase that contains multiple audio events, one of two things happens:

  CASE 1: If you begin scrubbing at a time where only one audio event is present, Studio Vision will play back that audio event. It will not play other audio events in the phrase, nor will it play MIDI events.

  CASE 2: If you begin scrubbing at a time where there is more than one audio event present, Studio Vision will not play anything. Studio Vision cannot scrub multiple audio events.
- If you scrub over a phrase that contains a single audio event along with MIDI events, Studio Vision will play the audio events only. No MIDI events will play.
- If you start scrubbing between phrases, Studio Vision will play all the MIDI events in all the tracks. No audio events will play.

CHAPTER 18: Gate Audio with Strip Silence

❑ About Gating

Studio Vision allows you to automatically gate digital audio using the **Audio>Strip Silence** command. When Studio Vision "gates" audio, it removes all audio in a selected range that falls below a specified amplitude threshold. This is useful for several reasons:

- You can remove unwanted noise that occurs below the lowest threshold of recorded audio (for example, analog tape hiss).
- You can break up one long audio event into separate short audio events in order to work with the audio more easily.

  Doing this has many benefits, including:

  a. You can easily copy and paste small sections of audio (such as a particular drum sound, or an oft-repeated vocal line).

  b. You can quantize individual events (such as separate drum hits in a recorded drum track).

  c. If you're syncing to tape and are playing back digital audio using only the session sample rate (as is required with Sound Manager), breaking audio into smaller events means there is less likelihood of digital audio drifting "out-of-sync" with audio on tape.
- It's a fast way to clear silent passages from your audio events.

If you want, you can remove any gated data from the audio file by compacting the audio file (as discussed in "Compact" on page 199). This conserves disk space.

❑ Using the Strip Silence Command

In digital recording, as in analog recording, some noise is always present. Usually it's too slight to hear, but sometimes it's apparent during silent passages.

To remove silent passages, first determine what amplitude level recorded audio lies above, then define that level as the silence threshold. Anything beneath the threshold will be defined as silence. When you choose **Audio>Strip Silence**, all audio that's beneath the threshold, and which lasts for a specified period, will be cleared.

You might also want to raise the silence threshold slightly to remove low amplitude noise that you can hear along with recorded audio. The higher you raise the silence threshold, though, the more recorded audio will get removed.

To specify the silence threshold:

1. **Make sure either "Fast" or "High Resolution" is checked in the Audio>Display Waveform submenu.**
   The Strip Silence procedure will not function if the waveform display is turned off.
2. **Select the event(s) or range of events you wish to strip silence.**
   In this example, we've selected a single, long audio event.

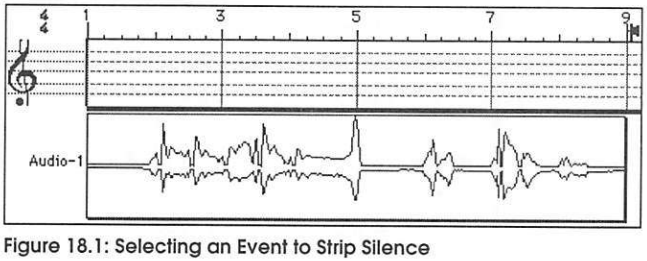


Figure 18.1: Selecting an Event to Strip Silence

3. **Choose Audio>Strip Silence.**
   Studio Vision opens the Strip Silence dialog box.

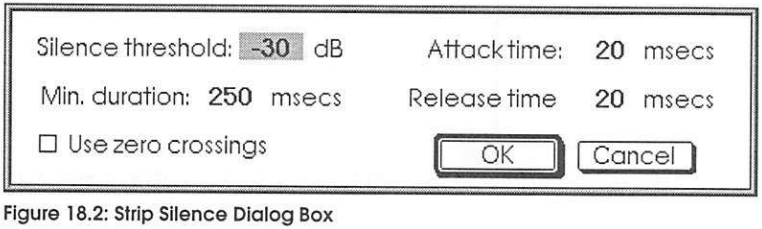


Figure 18.2: Strip Silence Dialog Box

4. **Set the desired Strip Silence parameters.**
   The Strip Silence dialog box is discussed in detail in "The Strip Silence Dialog Box" on page 175.
5. **Click the OK button.**
   Studio Vision removes all audio that stays below the chosen threshold for as long or longer than the chosen duration.

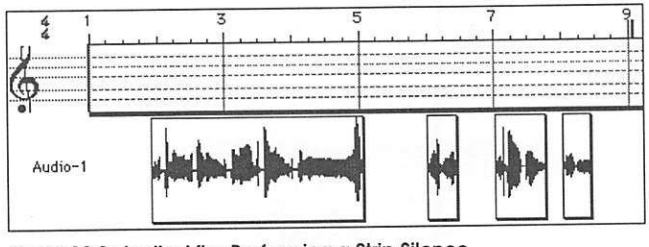


Figure 18.3: Audio After Performing a Strip Silence

6. **Audition the gated audio.**
   If you're not happy with its sound, choose **Edit>Undo Strip Silence** and try a different set of Strip Silence parameter settings.

Like other edit operations, the **Strip Silence** command is non-destructive. The silence data remains on your hard disk unless you compact or delete the file.

❑ The Strip Silence Dialog Box

When you select one or more audio events and choose **Audio>Strip Silence**, Studio Vision opens the Strip Silence dialog box.

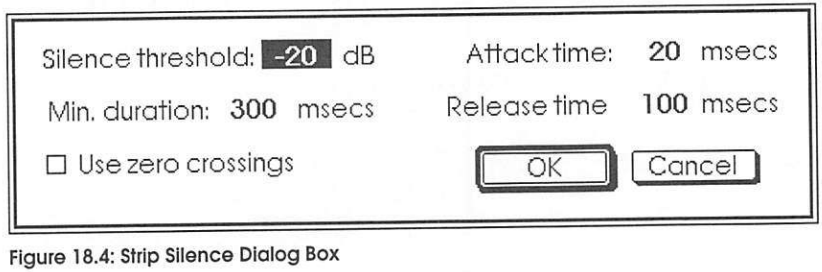


Figure 18.4: Strip Silence Dialog Box

As can be seen in Figure 18.4, the Strip Silence dialog box contains many elements. These are discussed in the following sections.

Silence Threshold

Use the **Silence threshold** numerical to set the number of dB below maximum amplitude that will be stripped away by the operation. You can set this number between -96 dB and 0 dB. Values close to -96 dB will strip away very little if any audio, since even the slightest amount of noise will be above the noise floor. Values close to 0 dB will strip away nearly all of the audio. Generally, a value between -40 dB and -20 dB is appropriate for most applications.

As shown in Figure 18.5, when you change the silence threshold, Studio Vision illustrates it graphically in the audio waveform display.

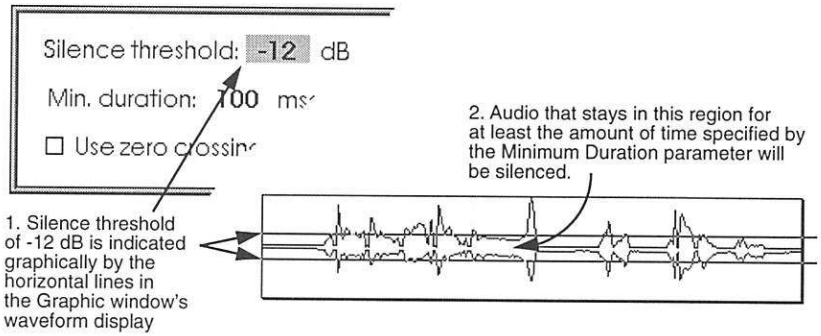


Figure 18.5: Graphic Feedback of Threshold Level

As an experiment, enter different values into the Silence threshold numerical and preview their effects in the Graphic window's waveform display. Feel free to experiment with different thresholds. Once you gate audio with the **Strip Silence** command, you can audition it—if you're not happy with the results, you can undo the **Strip Silence** command and try a different threshold level.

Minimum Duration

Besides setting a threshold level, you must also tell Studio Vision how *long* a signal must remain below that threshold before stripping it away. Use the **Min. Duration** numerical to set the amount of time the signal must stay below the threshold level before it's recognized as silence. You can set this number between 10ms and 1,000ms. Long settings, for example, will strip areas between phrases, but not the brief pauses between words or drum beats. Short settings will strip areas between words or even syllables. Values around 100 milliseconds make a good starting point.

As shown in Figure 18.6, setting a smaller duration results in more (but shorter) audio events than setting a longer duration.

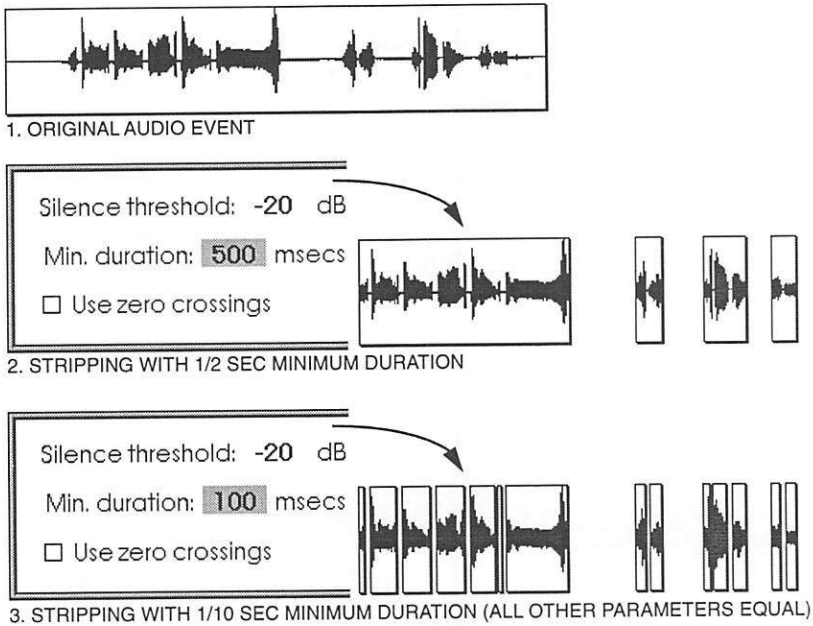


Figure 18.6: Effect of Different Minimum Duration Settings

Feel free to experiment with different durations. Once you gate audio with the **Strip Silence** command, you can audition it—if you're not happy with the results, you can undo the **Strip Silence** command and try using a different Minimum Duration.

Attack Time

Use the **Attack Time** numerical to set the amount of time it takes for the audio signal immediately following a stripped section to regain its full volume. Setting an attack time can make the after-effects of strip silencing sound more natural. The length of the attack time you choose will depend on the sonic characteristics of your audio file. Allowable values are between 0 ms and 1,000 ms (1 second).

Feel free to experiment with different attack times. Once you gate audio with the **Strip Silence** command, you can audition it—if you're not happy with the results, you can undo the **Strip Silence** command and try using a different Attack Time. For an example of how to use the Attack Time parameter, see "Strip Silence Example" on page 179.

Release Time

Use the **Release Time** numerical to set the amount of time it takes for the audio signal immediately preceding a stripped section to fade out. As with the **Attack Time** numerical, setting a release time can often sound more natural than an instantaneous change in volume. The length of the release time you choose will depend on the sonic characteristics of your audio file. Allowable values are between 0 ms and 1,000 ms (1 second).

Feel free to experiment with different release times. Once you gate audio with the **Strip Silence** command, you can audition it—if you're not happy with the results, you can undo the **Strip Silence** command and try using a different Release Time. For an example of how to use the Release Time parameter, see "Strip Silence Example" on page 179.

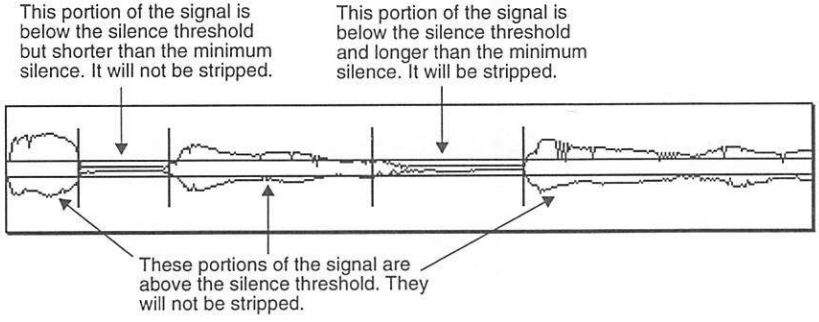
Use Zero Crossings

☒ Use zero crossings

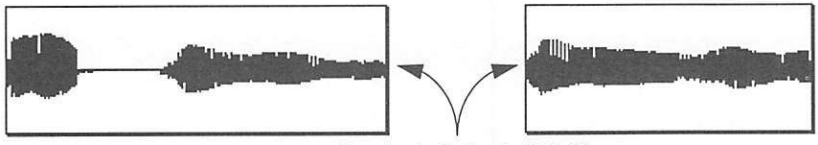
When you use the **Strip Silence** command, Studio Vision creates many new audio events out of an old one. If you have checked **Use zero crossings**, Studio Vision will make sure that each of these new events begin and end at a zero crossing in the audio's waveform. This option can minimize unwanted clicks at the start and end points during playback.

❑ Strip Silence Example

In this example, we set the Silence Threshold to -20 dB and the Minimum Duration to 100 ms.

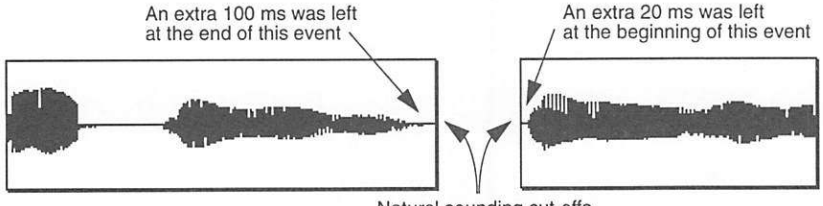


After stripping the silence, we are left with two separate audio events:



Abrupt cut-offs due to Strip Silence

Because of the Strip Silence operation, the left audio event may cut-off too early and the right audio event may begin abruptly. We can correct this problem by setting a Release Time and an Attack Time—in this case, we set a Release Time of 100 ms and an Attack Time of 20 ms, then repeated the Strip Silence operation.



Natural sounding cut-offs due to Attack and Release settings

Using Attack and Release can result in more natural-sounding events when you use the Strip Silence command.

CHAPTER 19: Mixing Digital Audio

If you're familiar with mixing down or bouncing tracks in analog recording, you'll be familiar with the basic idea of Studio Vision's mix procedures.

Studio Vision offers two methods of mixing audio:

- **Direct Audio Mixing**: Use the **Audio>Mix Audio** command to mix together multiple audio events into a single file on a single Audio Instrument.
- **Capturing a Mix**: Check the **Audio>Mix Audio on Capture** option and use either of the **Edit>Capture** commands to mix together all audio *and* MIDI events into a single track or sequence.

Both of these methods mix the selected audio data together into a new composite file as discussed in "The Mixed Audio on Your Hard Disk" on page 191. The following sections discuss both methods of mixing digital audio.

❑ Direct Audio Mixing

Direct audio mixing is the process of mixing together digital audio from anywhere within a sequence without actually playing it—Studio Vision examines the selected audio files and calculates a new, mixed file. Direct audio mixing is performed by the **Audio>Mix Audio** command. This command mixes together selected audio events and their velocity settings. Also, if you select volume and pan controllers assigned to Audio Instruments, they will be integrated into the new mixed audio file.

NOTE: If you mix to a mono file, Studio Vision ignores all Pan controller events.

The **Mix Audio** command lets you mix the following:

- audio from multiple tracks
- audio on multiple Instruments within tracks
- entire audio events
- sections of audio events
- volume and pan

There is virtually no limit to the amount of audio that you can mix or the number of tracks from which you can choose audio to mix. You are limited only by the available space on your hard disk.

The **Mix Audio** command mixes down stereo or mono audio events into the current track and they become a single mono or stereo audio event on one Audio Instrument.

Using the Mix Audio Command

If you're mixing anything except entire tracks, you'll probably find the easiest way to select audio is by placing everything in the same track—then you can use the Graphic window to see the time ranges of all Audio Instruments and simply drag across what you want to mix.

To mix audio in the Graphic window:

1. **Select the audio events (or sections of events) you'd like to mix.**
   In this example, you will mix all audio events that fall within a specified time range.

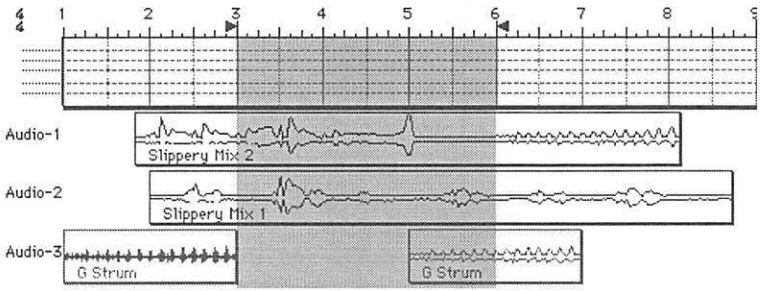


Figure 19.1: Select Audio to Mix

IMPORTANT: If you want to include volume and pan information in the mix, you *must* include those events in your selection.

2. **Decide whether or not to normalize the audio you're about to mix.**

   Normalizing causes Studio Vision to increase the amplitude of a low level audio file so that its peak value equals 0dB, thus insuring maximum signal-to-noise ratio. To automatically normalize mixed audio, check the **Audio>Normalize on Mix** option.

3. **Choose Audio>Mix Audio.**

   The Specify Mix Result dialog box appears.

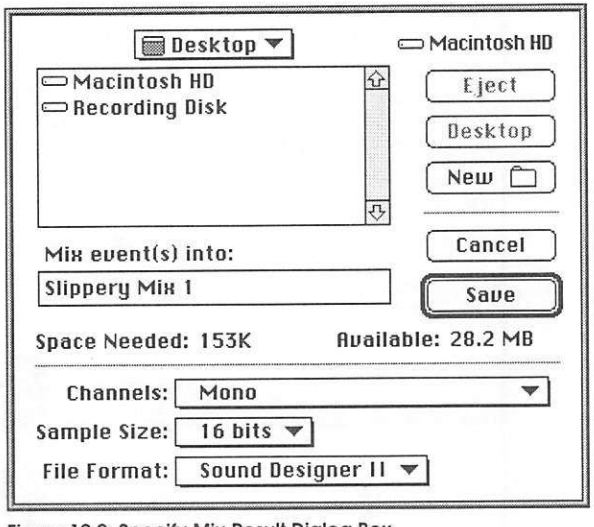


Figure 19.2: Specify Mix Result Dialog Box

4. **Use the pop-up menus to tell Studio Vision the type of file you want to create with the mixed data—whether it's mono or stereo, the number of bits and the file format.**

   For more information about the Specify Mix Result dialog box, see "The Specify Mix Result Dialog Box" on page 186.

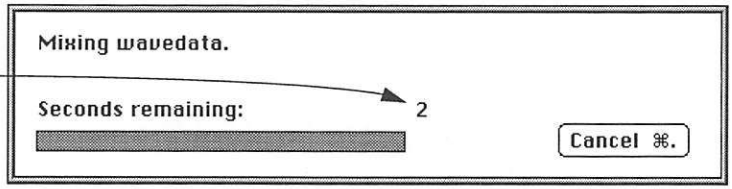
5. **Use the upper portion of the dialog box to name the audio file that will contain the newly mixed audio.**

6. **Click the Save button.**

   Studio Vision computes the mix of the wavedata it's mixing.

   If you chose to mix audio to **Stereo-two mono files**, clicking the **Save** button opens a second dialog box in which you name and save the right channel file.

Note: the number of seconds refers to the length of the audio file, not the amount of time required by the mix operation.



   Then, if you checked the **Audio>Normalize on Mix** option, Studio Vision will normalize the result.

   After mixing and normalizing the waveform, Studio Vision computes a new waveform display based on the selected **Audio>Display Waveform** option (as discussed in "Viewing Audio Events as Waveforms" on page 116).

7. **Next, you'll be prompted to choose an Audio Instrument to assign to the mixed audio event.**

8. **Press and hold the mouse on the Audio Instrument name displayed in the dialog box and select a new Audio Instrument from the pop-up menu.**

   As shown in Figure 19.3, the new, mixed event appears on the new Audio Instrument. The audio events you selected for the mix are removed from the track in the sequence, but the audio files those events pointed to remain unaltered in their original files on your hard disk.

   The newly created audio event will now point to the new audio file that contains the mixed audio data.

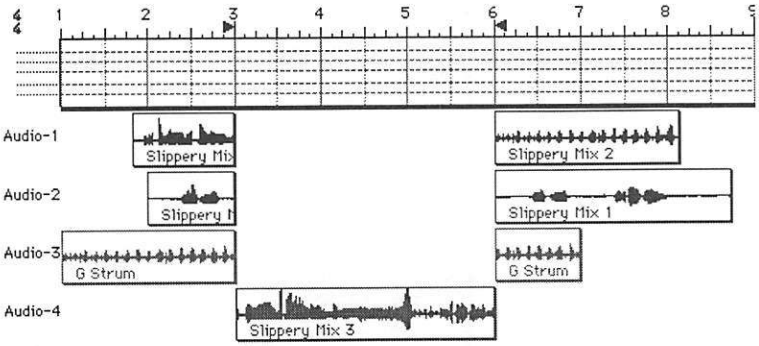


Figure 19.3: Mixed Event on a New Audio Instrument

9. **Select the mixed event by clicking in its select region, then play it back by choosing Do>Play Selection.**

   If you're not satisfied, you can undo the mix operation by choosing **Edit>Undo**.

The Specify Mix Result Dialog Box

Whenever you ask Studio Vision to mix audio data together, it opens the Specify Mix Result dialog box. When you mix audio data, Studio Vision creates a new audio file in which it stores the mixed audio. Use the Specify Mix Result dialog box to tell Studio Vision what type of audio file you want it to create for the new audio.

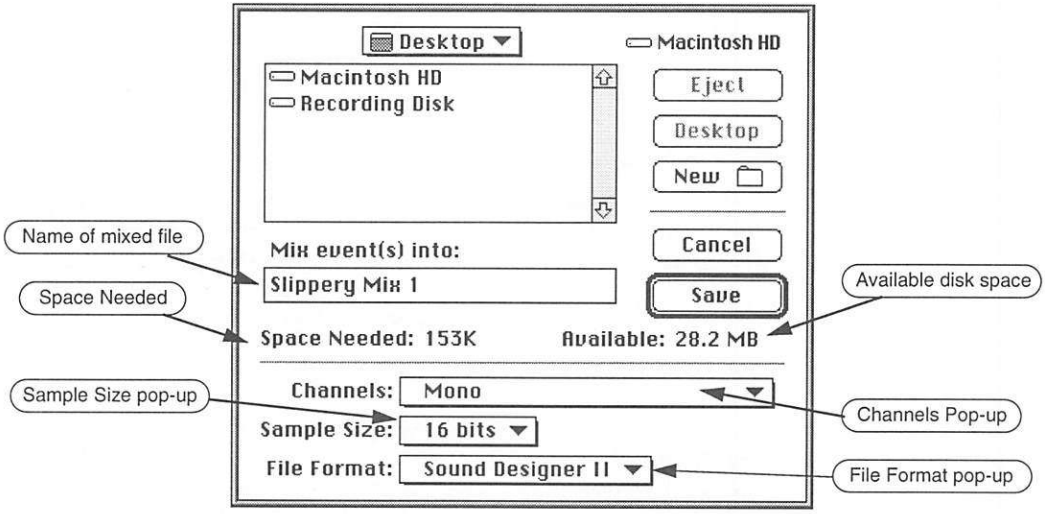


Figure 19.4: Specify Mix Result Dialog Box

As shown in Figure 19.4, the dialog box contains the following elements:

- **Name of mixed file**: Use this area to name the file that will contain the mixed audio.
- **Space Needed**: Studio Vision calculates the amount of disk space that the new mixed audio file will require and displays it in this portion of the dialog box. If you're mixing to stereo and want to create two mono files, you'll need double the amount of space indicated here.
- **Available Disk Space**: This area shows the amount of free space on the selected hard disk.

- **Channels** pop-up: From this pop-up menu, select the type of file you want to mix the audio into. Note that there are three types:

  Select the **Mono** option to mix to a single, monophonic audio file.

  Select the **Stereo-One Interleaved File** option if you're using Studio Vision with Sound Manager, or if you want a stereo file you can open and edit in Sound Designer II.

  Select the **Stereo-Two Mono Files** option if you're going to play back the mixed file in stereo using Studio Vision with DAE. Studio Vision, when used with DAE, can only play back the left channel of an interleaved file. When mixing with this option, you'll get back-to-back Mix Result Dialog boxes—the first dialog box defines the left channel; the second dialog box defines the right channel and disables all the pop-up menus.
- **Sample Size** pop-up: From this pop-up menu, select the desired sample resolution (either 8-bit or 16-bit) for your new mixed audio file. DAE cannot play 8-bit files.
- **File Format** pop-up menu: From this pop-up menu, select the desired file format (either SD II or AIFF) for your new mixed audio file.

NOTE: It's possible to create file formats and stereo file types that are unsupported by the audio system you're currently using. For example, if you're using DAE, you can mix audio into an interleaved stereo file even though DAE does not support playback of interleaved stereo files. This allows you to create files that can be read by other versions of Studio Vision, or be used with a digital audio management system other than the one you're currently using. It's up to you to know the limits of your hardware and audio system when you specify a mix result.

❑ Capturing a Mix

Capturing a mix is the process of mixing together entire sequences into a new track or sequence by having Studio Vision actually "play" all the data you want mixed. To capture digital audio in the mix, you must use one of the **Edit>Capture** commands in conjunction with the **Audio>Mix Audio on Capture** option.

Unlike the **Mix Audio** command, capturing will mix both digital data *and all MIDI data* into a new track or sequence. Capturing is a process that redefines your sequence as a serial stream of events. It "plays" data from your original sequence into a destination sequence or track and reinterprets the timing of data in real time so that data is stored as a chronological stream of events. Capturing is discussed in detail in your Vision Reference Manual.

You can either capture a sequence to a track (using **Edit>Capture Seq->Track**) or you can capture a sequence to another sequence (using **Edit>Capture Seq->Seq**). If you capture to a track, a single stereo or mono audio event will go into that track, along with any other non-audio events. If you capture to a sequence, the single audio event will go in the first track and any other MIDI or text events will go in other tracks; one MIDI Instrument to a track.

Mixing with the Capture Command

IMPORTANT: When you mix digital audio by capturing, make sure you have an appropriate volume or pan controller at the very beginning of your sequence. If you don't place one at the beginning and you happen to have audio events located before any volume or pan controller events, those audio events will use the volume or pan controller last sent to that Audio Instrument.

To mix audio using the **Capture** command:

1. **Select a sequence by clicking its selector dot in the Sequences window.**

   Alternately, if you want to capture only certain tracks or events, simply select one or more tracks in the Tracks window, or select individual audio and controller events in a Graphic or List window.
2. **Choose Edit>Copy.**

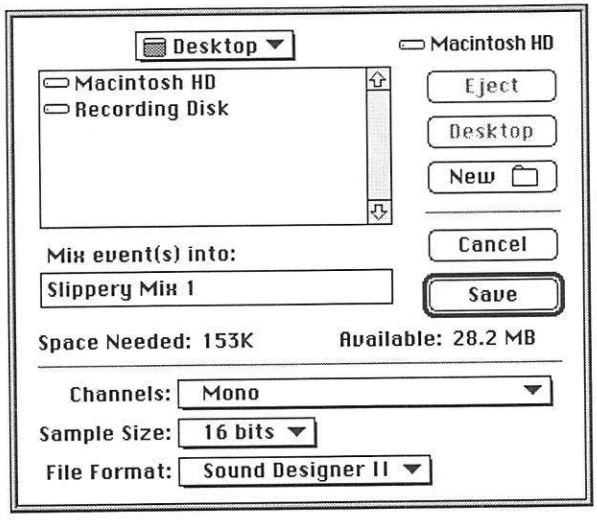
   Studio Vision copies your selection to the Clipboard.
3. **Select a destination for the capture (either a track or a sequence).**
4. **Make sure Audio>Mix Audio on Capture is checked.**

5. **Decide whether or not to normalize the audio you're about to mix.**

   Normalizing causes Studio Vision to increase the amplitude of a low level audio file so that its peak value equals 0dB, thus insuring maximum signal-to-noise ratio. To automatically normalize mixed audio, check the **Audio>Normalize on Mix** option.

6. **Choose Edit> Capture Seq—>Seq (or Edit>Capture Seq—>Track).**

   The Specify Mix Result dialog box appears.



7. **Use the pop-up menus to tell Studio Vision the type of file you want to create with the mixed data—whether it's mono or stereo, the number of bits and the file format.**

   For more information about the Specify Mix Result dialog box, see "The Specify Mix Result Dialog Box" on page 186.

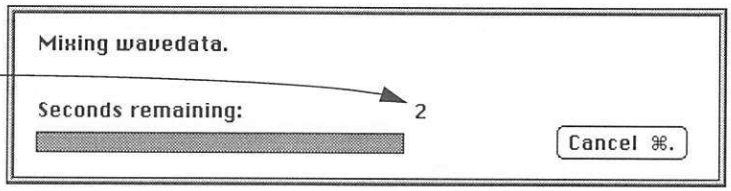
8. **Use the upper portion of the dialog box to name the audio file that will contain the newly mixed audio.**

9. **Click the Save button.**

   Studio Vision computes the wavedata it's mixing.

   If you chose to mix audio to **Stereo-two mono files**, clicking the **Save** button opens a second dialog box in which you name and save the right channel file.

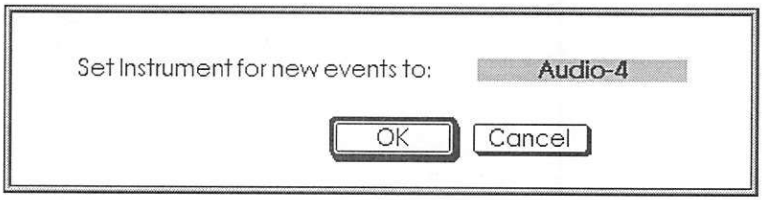
Note: the number of seconds refers to the length of the audio file, not the amount of time required by the mix operation.



   Then, if you checked the **Audio>Normalize on Mix** option, Studio Vision will normalize the result.

   After mixing and normalizing the waveform, Studio Vision computes a new waveform display based on the selected **Audio>Display Waveform** option (as discussed in "Viewing Audio Events as Waveforms" on page 116).

10. **Next, you'll be prompted to choose an Audio Instrument to assign to the mixed audio event.**



11. **Press and hold the mouse on the Audio Instrument name displayed in the dialog box and select a new Audio Instrument from the pop-up menu.**
12. **Click the OK button.**

    All captured audio and MIDI events will appear in the destination track or sequence you selected.

    If you capture to a track, a single mono or stereo audio event will be on the destination track, along with any other non-audio events.

    If you capture to a sequence, a single mono or stereo audio event will be on the first track. Any other events will be in other tracks, one MIDI Instrument to a track.

❑ The Mixed Audio on Your Hard Disk

Mixing audio always copies the original, selected audio into a new mixed audio file on your hard disk. The original *audio files* chosen for the mix remain untouched on your hard disk and, if you used the **Mix Audio** command (not **Capture**), Studio Vision removes the original *audio events* from your sequence. After doing a mix, you might want to remove the original files from the File Management window's list, or delete them (as discussed in "Compact" on page 199).

❑ Mixing "Silence"

The blank regions that exist between audio events contain no audio data and, therefore, require no disk space (as shown in Figure 19.5).

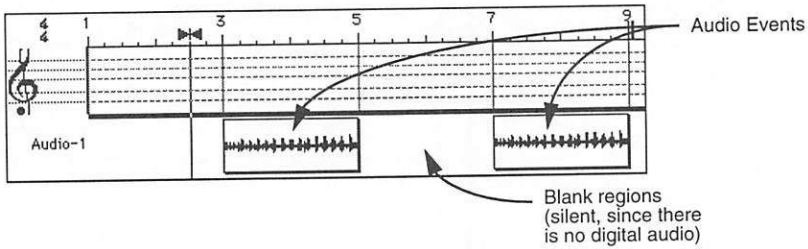


Figure 19.5: Blank Regions

When you mix a range of audio, Studio Vision creates "silent" digital audio for the blank regions that exist between audio events. This can result in a mixed audio file that's larger than the combined length of the original audio files (as shown in Figure 19.6).

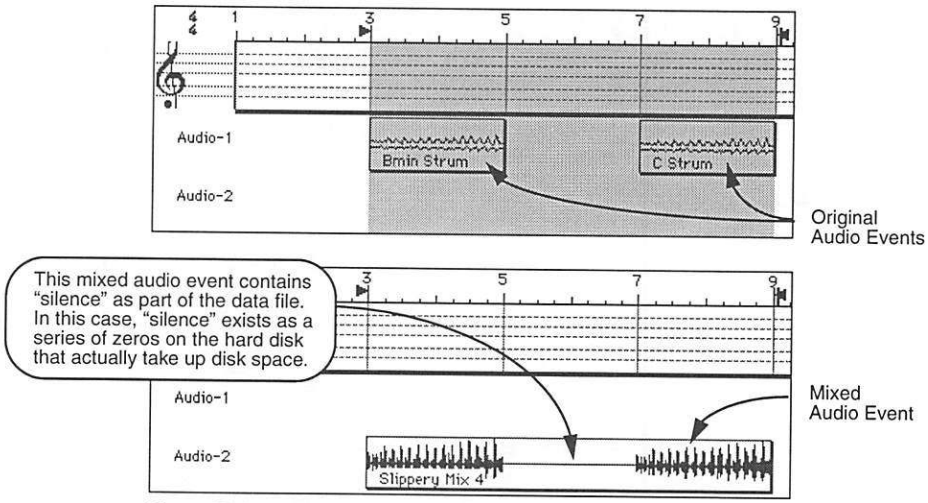


Figure 19.6: Blank Area Mixed As "Silent" Data

Getting Rid of Mixed Silence

Normally, you'll want to remove significant areas of "silent" audio data since it occupies hard disk space unnecessarily. You can delete the silent areas manually, or you can use the **Audio>Strip Silence** command to remove them automatically (as discussed in "Chapter 18: Gate Audio with Strip Silence"). Once you delete the silent regions, you can compact the file (as discussed in "Compact" on page 199) to regain the space on your hard disk.

Using Mixed Silence

There are times when you might need to create and use "silent" audio data. Silent data is often necessary when you want to create Studio Vision audio files that are compatible with other programs, such as Sound Designer. When exporting audio files into a program other than Studio Vision, you need to add silent data between audio events in order to maintain the timing relationship between them.

If you're using the **Mix Audio** command or the **Capture** command, you may mix silence into the sound file as shown in Figure 19.6 on page 192.

CHAPTER 20: File Management

❑ Audio Files

Audio files contain data stored as a series of samples (numbers) that create a digital representation of an audio waveform.

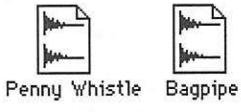


Figure 20.1: Audio Files as They Appear in the Finder

In most instances, you will not use all the audio you initially recorded. This may be because you have eliminated certain "takes", or because you have deleted portions of some audio events (such as with the **Audio>Strip Silence** command). Even though you have deleted the *pointers* to the unwanted digital audio, the actual audio remains on your hard disk.

You can see which audio files are used by the current sequence file, information about those audio files, and how much of the audio file is actually used by the sequence file.

All of this information is available in the File Management dialog box. To open this dialog box, choose **Audio>File Management**.

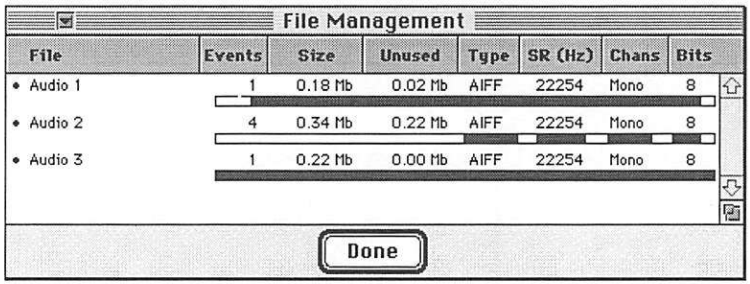


Figure 20.2: Typical File Management Dialog Box

❑ Overview of the File Management Dialog Box

The File Management dialog box contains information about each audio file used by the active Studio Vision document. Since each file may use a unique group of audio files, the File Management dialog box displays only the audio files relating to the Studio Vision document currently open.

In addition, the File Management dialog box allows you to see how much of an audio file is unused by the Studio Vision document and, if desired, delete the unused data from your disk by compacting the file.

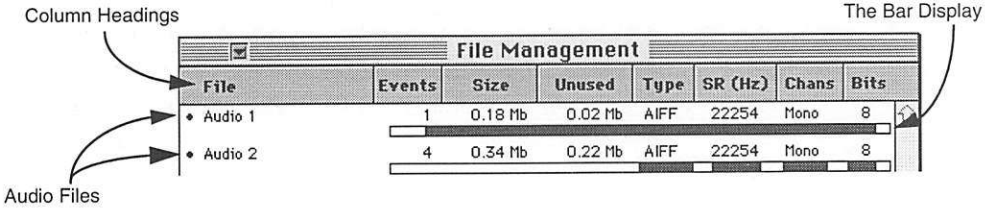
NOTE: If you're using DAE, you can listen to any 16-bit audio file by choosing **Audio>Import**, selecting the file and clicking the Play button in the Import dialog box. With Sound Manager, you can audition both 8-bit and 16-bit AIFF files, but not Sound Designer II files.

It's up to you to keep track of audio files you recorded to your hard disk that are no longer referenced by any Studio Vision document; Studio Vision will not display these files, even though they are actually on your hard disk. Studio Vision displays audio files in the File Management dialog box only from the perspective of the active Studio Vision document.

There is much information and many options available in the File Management dialog box. The following sections discuss all the features and functions of that dialog box.

Viewing Audio File Information

The File Management dialog box contains a line entry for each audio file referenced by the active Studio Vision document.



The Bar Display

The long rectangular bar displays graphically how audio data is used in each particular audio file. Grey areas indicate areas of the audio file that are used by the active Studio Vision sequence file and white areas indicate unused data. The more "pockets" of unused data you see in a file, the more likely it is that you may want to compact or consolidate it (as discussed in "Organizing Audio Files" on page 199).

File Column

This column displays the name of each audio file referenced by the active Studio Vision document

Events Column

This column shows the number of audio events in the active Studio Vision document that "point" to audio data within each audio file. This includes events on the Clipboard and in the Undo buffer—therefore, if you have cut some audio or undone an edit operation, you may want to clear it from this column by using the **Clear Clip and Undo** command (as discussed in "Clear Clip and Undo" on page 206).

Size Column

This column shows (in megabytes) the total amount of data in the audio file, which includes both used and unused data.

Unused Column

This column shows (in megabytes) the amount of data in the audio file that is *not* referenced by any audio events in the active Studio Vision document.

When you first record audio you'll see that the audio file (represented by the rectangular bar) is completely grey, which means all data in the file is being used.

If you edit your recording—stripping silence, cutting, or clearing audio events—portions of data in the audio file will no longer be used since the sequence file no longer contains audio events pointing to them.

NOTE: This column shows data that's unused by the *active* sequence file. It's up to you to remember which audio files are shared by different sequence files.

Type Column

This column tells you the audio file's format and what possible program the file originated in. There are four file types that Studio Vision can read:

- **SD II**: Sound Designer II file format used by Sound Designer II and by Studio Vision when recording with DAE.
- **AIFF**: Audio Interchange File Format used by Sound Designer II, Audioshop, and other programs and by Studio Vision when recording with Sound Manager.
- **SD I**: Sound Designer file format used by the original version of Sound Designer.
- **MSND**: Created by the MacMix program for the Dyaxis.

Sample Rate Column

This column shows the sample rate (in Hz) of each audio file.

Channels Column

This column tells you whether the respective audio file is mono or interleaved stereo. Linked stereo files (such as those recorded when using Studio Vision with DAE) appear as two mono files. Interleaved stereo files (such as those recorded when using Studio Vision with Sound Manager) appear as a single stereo file.

Bits Column

This column shows the sample size (in bits) of each audio file.

❑ Organizing Audio Files

There are a number of commands available from the File Management dialog box menu. To access them, press and hold the small, downward pointing triangle in the dialog box's title bar.

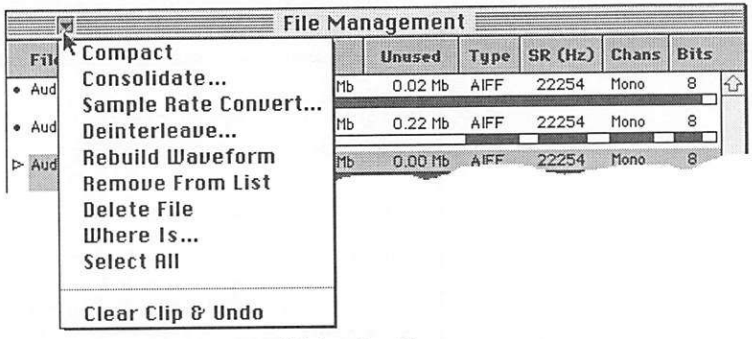


Figure 20.3: File Management Dialog Box Menu

Compact

Compact throws away audio data that is not referenced by any audio events in the active Studio Vision document. The remaining audio file data that the Studio Vision document is using moves together to save disk space.

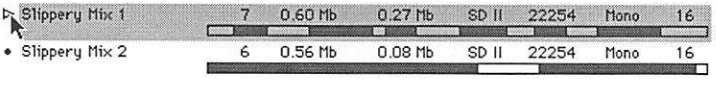
Keep in mind that Studio Vision has no way of knowing if hard disk data is being used by a Studio Vision document that is not currently open. When you decide to compact an audio file, make sure you don't have another Studio Vision document sharing data in the audio file because that Studio Vision document's audio may be deleted or changed.

Before using this command, you should use the **Clear Clip and Undo** command so that you see an accurate display in the File Management dialog box. See "Clear Clip and Undo" on page 206.

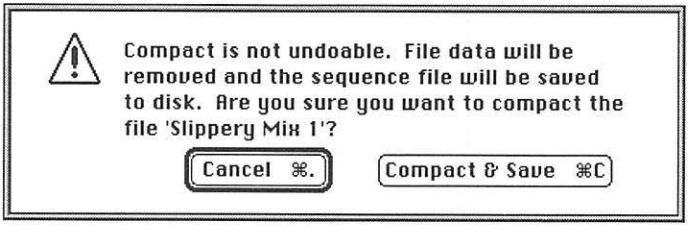
IMPORTANT: Compacting cannot be undone and is a destructive operation—that is, you cannot recover your original data once you use this command.

To compact a file:

1. **Select the file by clicking its selector dot in the File Management dialog box.**
   You can compact multiple files by shift-clicking their selector dots.

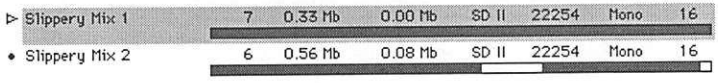


2. **Choose Compact from the File Management dialog box menu.**
   For each file you selected to compact, you'll be warned that compacting cannot be undone.



3. **Click Compact & Save to continue.**
   If the file has been previously saved it will be resaved.
   Studio Vision compacts the file by removing the unused data, then rebuilds the waveform. The more file data that is being compacted, the longer the compact will take.

4. **Notice the amount of unused space is now zero and the bar is entirely gray.**
   The unused data is no longer on your hard disk.



Consolidate

Consolidate copies audio file data from one or more audio files referenced by the active Studio Vision document and places them together into a single audio file. The original files remain untouched, and the new file contains only data actually *used* by the active Studio Vision document. The consolidated data is placed side by side in the new file; this command does not mix audio events.

All events in the active Studio Vision document that referenced the files you consolidated will now point only to the data in the new file.

When you consolidate files, you'll see the new file displayed in the File Management dialog box; the Bar display will be completely grey showing that all data in the file is in use by the active Studio Vision document. You will also see the original files displayed, but the Bar display will be completely white, indicating no data in those files is being referenced by the active Studio Vision document.

Consolidating files is useful for a couple reasons:

- You've finished editing a song and, for simplicity, you want one Studio Vision document that references one consolidated audio file.
- Your song uses audio files that are also referenced by other Studio Vision documents and you want to create an audio file used *only* by the active Studio Vision document.

Once you have a consolidated file, you can delete the original files to clear up disk space (if they don't contain any data needed by other Studio Vision documents).

IMPORTANT: Studio Vision cannot consolidate files with different sample rates and it cannot consolidate interleaved stereo files with mono files. Also, consolidated files retain their file type. For example, AIFF files remains AIFF files and Sound Designer II files remain Sound Designer II files.

To consolidate files:

1. **Select a file by clicking its selector dot in the File Management dialog box.**
2. **Shift-click on the selector dots of additional files to select or deselect them.**
3. **Choose Consolidate from the File Management dialog box menu.**

   Studio Vision opens a standard Save As dialog box. Since consolidating files creates a new audio file, you must name it and save it before Studio Vision can create the data for the new file.
4. **Name and Save the new Audio File.**

   Studio Vision creates a single consolidated audio file.

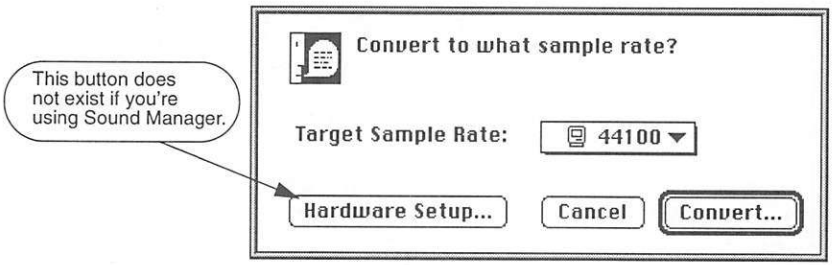
Sample Rate Convert

If some of your audio files have sample rates that are different than the session sample rate, you can use the Sample Rate Convert command to convert their sample rates to the session sample rate. Sample Rate conversion creates a new audio file on your hard disk. Sample rate conversion and theory is discussed in more detail in "Chapter 21: Sample Rate Conversion and Deinterleaving".

To convert a file's sample rate:

1. **Select an audio file by clicking its selector dot in the File Management dialog box.**
2. **Choose Sample Rate Convert from the File Management dialog box menu.**

   Studio Vision opens the Sample Rate Conversion dialog box.

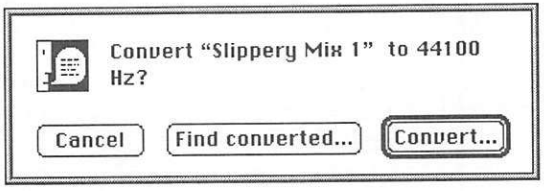


3. **From the pop-up menu, select the desired sample rate.**

   If you need to change your hardware sample rate, click the Hardware Setup button to open the hardware setup dialog box. This button is available only for DAE users.

4. **Click the Convert button.**

   Studio Vision opens a dialog box asking if you really want to perform the sample rate conversion.



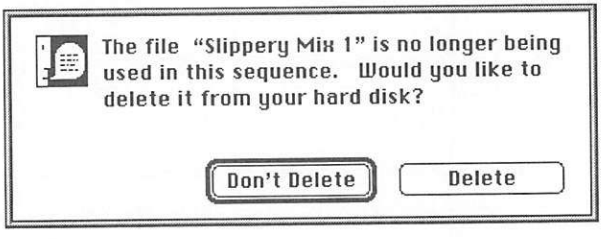
5. **Click the Convert button.**

   If you have an audio file that you share between multiple Studio Vision documents, you need only convert it once. Any time you open a Studio Vision document that still references the old, unconverted audio file, you can click the **Find converted** button to tell Studio Vision where to find the audio file that you converted previously.

6. **Studio Vision opens a standard Save As dialog box.**

7. **Use the dialog box to name and save the new file you're about to create.**

   Since the active Studio Vision document will now point to the newly created audio file, Studio Vision will ask if you want to delete the original audio file from your hard disk.



8. **Click the Don't Delete button if you want to save your original file, or click the Delete button if you don't need the original file any longer.**

Deinterleave

Choose this command to deinterleave the entire audio file. DAE does not support playback of interleaved files, so you may find it necessary to deinterleave any files that were imported from Sound Designer II or recorded in stereo with Sound Manager.

Rebuild Waveform

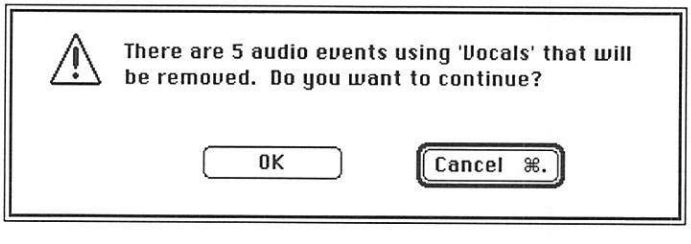
Rebuild Waveform rebuilds the waveform summary for an audio file. Studio Vision stores the waveform summary in RAM and uses it to display waveforms quickly without reading the actual data from the hard disk.

If you export audio from Studio Vision to another program, edit it, then import the audio back into Studio Vision you may have to use the **Rebuild Waveform** command so that Studio Vision can display the waveform accurately.

NOTE: The latest versions of Sound Designer and Pro Edit will update the summary within these programs, so Studio Vision will not need to recompute the summary again. If the length of the audio file changes, and the summary was not updated in another program, Studio Vision will be aware of the necessity to recompute the waveform summary. However, if the length of the file does not change, and the waveform summary was not updated, Studio Vision has no way of knowing that the audio was edited and will not recompute the summary. You will need to use the **Rebuild Waveform** command.

Remove from List

Remove from List removes the name of an audio file from the File Management list, and also removes any audio events from the active Studio Vision document that reference the file. It does not affect hard disk storage.



This is useful if, for example, you dislike a particular take used by multiple tracks in your sequence; instead of opening all the tracks and deleting the audio events, you could just remove the file from the list.

Remove from List is also useful if you consolidated a file into a new file and the original—now unused—file is still listed in the File Management list. Since your Studio Vision document is no longer referencing data in it, you might want to remove it from the list.

Delete File

Delete File does affect hard disk data, deleting actual audio files, and it cannot be undone. Before the file is deleted you'll be warned that audio events in your sequence are referencing data in the file, and they'll be deleted from the sequence if you delete the file.

Where Is

Normally, if you rename an audio file or move it to a new location, Studio Vision is smart enough to find it. But if an audio file gets lost for some other reason, choose **Where Is** to display a dialog box asking you to locate the missing audio file.

Once you locate a lost audio file, you must save the sequence file to update its pointer to the audio file's new name or location.

If you cancel the Where Is dialog box, the sequence file won't update its pointer to the audio file and you'll be asked to find it each time you open the sequence file.

Select All

Select All selects all the files listed in the File Management dialog box.

Clear Clip and Undo

Clear Clip and Undo clears everything stored in the Macintosh Clipboard and the Undo buffer.

Although you can see in the File Management dialog box how much of your hard disk data is being used in a sequence, the display also takes into account audio events that are stored on the Clipboard or in the Undo buffer. It regards data in either of these two holding areas as still being used by the sequence. If you want to see an accurate, current display in the File Management dialog box you should clear the Clipboard and the Undo Buffer.

You shouldn't perform this operation if you have any information in the Clipboard or the Undo Buffer that you still want.

CHAPTER 21: Sample Rate Conversion and Deinterleaving

You may sometimes find it necessary to either convert the sample rates of existing digital audio files or deinterleave them. There are a couple reasons for this:

- If you used Studio Vision version 1.4 or earlier, you may need to convert your audio files to use them with version 2.0 if:
  a) A version 1.4 or earlier Studio Vision document references multiple audio files that are not all at the same sample rate. Version 2.0 requires that all audio files in a Studio Vision document have the same sample rate.
  b) A version 1.4 or earlier Studio Vision document uses interleaved stereo files, and you want to play it back using DAE, which does not support playback of interleaved files.
- You are importing audio files that have different sample rates than the audio files already referenced by your sequence file.

❑ About Sample Rate Conversion

The sample rate of an audio file is the number of samples that make up 1 second worth of audio. Higher sample rates produce better audio quality, but use more disk space (because there are more sample points per second). You can save disk space by using a low sample rate, but this degrades the sound quality.

In Studio Vision, all audio events in the sequence must use the same sample rate. This sample rate is called the *Session Sample Rate*.

Hardware Sample Rate vs. Session Sample Rate

Before you can understand sample rate conversion, you must be aware of the differences between the "hardware sample rate" and "session sample rate". Specifically:

- **Hardware Sample Rate**: Most professional hardware will play audio at one of only a few standard sample rates, such as 44100 Hz (CD quality) or 48000 Hz. (See your hardware manual to learn what sample rate(s) it uses). You can see what rate your hardware is set to by looking in Studio Vision's **Audio>Hardware Setup** dialog box.
- **Session Sample Rate**: Studio Vision 2.0 requires that all your audio files have the same sample rate, which is called the Session Sample Rate. This rate need not be the same as the Hardware Sample Rate, but you will get better audio quality if it is. The reason is that when the Session Sample Rate is different than the Hardware Sample Rate, your digital audio system (DAE or Sound Manager) must convert the sample rate of the data it gets from the audio files before sending it to the hardware (see "About On-The-Fly Conversion" on page 209), and this conversion process degrades audio fidelity somewhat.

Conversion Processes

Studio Vision supports two types of Sample Rate Conversion techniques:

- **On-the-Fly** conversion: On-the-fly conversion occurs when Studio Vision plays or records an audio file at a sample rate that's different than the hardware sample rate.
- **Off-Line** conversion: Off-line conversion occurs when you ask Studio Vision to convert a particular audio file from one sample rate to another.

The following sections discuss the differences between off-line and on-the-fly conversion.

About On-The-Fly Conversion

On-the-fly conversion is automatically performed whenever you record or play audio whose sample rate does not match the hardware sample rate. On-the-fly conversion alters the sample rate in real-time during recording or playback.

SOUND MANAGER NOTE: If you're using Sound Manager, on-the-fly conversion may result in a reduced number of playback channels.

In general, you should avoid on-the-fly conversion since it can introduce slight spectral distortion, which may be audible. To avoid on-the-fly conversion, you should record all your files with a session sample rate equal to your hardware sample rate. If your Studio Vision document contains audio files that do not match the current hardware sample rate, it is best to convert their sample rates to the hardware sample rate using off-line conversion (discussed in the following section).

About Off-line Conversion

Off-line conversion is preferable to on-the-fly conversion. If you're using DAE, great sonic improvement is achieved through off-line conversion due to high-quality digital filtering. If you're using Sound Manager, the results are not as impressive as with DAE.

Performing an off-line conversion will create a new audio file on your hard disk. You can then choose to delete the old version of the file. To perform an off-line conversion, choose **Audio>Conversion Overview** to open the Conversion Overview dialog box. For more information, see the following section.

About Deinterleaving

Studio Vision, when used with DAE, does not play back interleaved stereo files. If you have old interleaved stereo audio files you wish to use with Studio Vision 2.0 (and DAE), you must deinterleave them. This process turns your single interleaved stereo file into two linked mono files. It does not change the sound quality.

Deinterleaving will create two files, each half the size of the original file.

If you're using DAE and you choose *not* to deinterleave your audio file, only the left side of the stereo signal will play.

NOTE: If you're using Sound Manager, you don't have to de-interleave your old Studio Vision 1.4 and earlier stereo files.

Converting Sample Rates and Deinterleaving

If you need to convert audio files, follow these steps:

1. **Open the sequence file that references the audio files you wish to convert.**
   If you open a sequence file with references to audio files that need conversion, the Conversion Overview dialog box will open automatically. If the Conversion Overview dialog box doesn't open, then the sequence file does not reference audio files that need conversion.

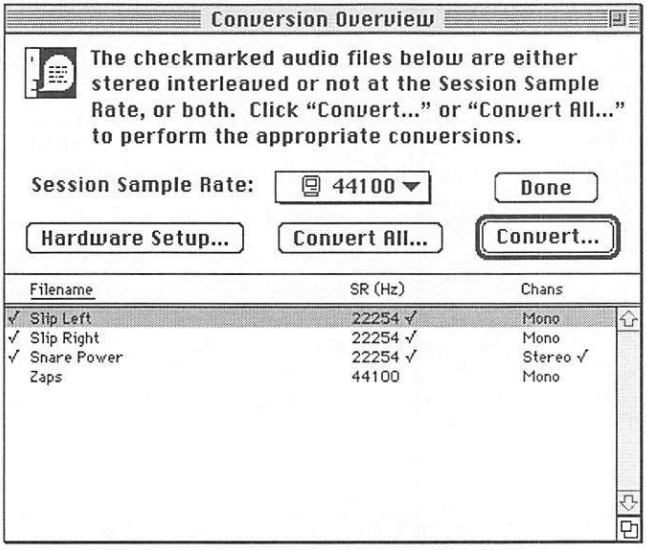


Figure 21.1: Conversion Overview Dialog Box

2. **Choose the target sample rate from the Session Sample Rate pop-up**

   Set the session sample rate to the same value as the hardware sample rate.

3. **Click Convert All.**

   The files will be converted according to the Sample Rate and Deinterleave settings in the file list. For more information on the Conversion Overview dialog box, see "The Conversion Overview Dialog Box" on page 212.

4. **You will be asked to confirm the conversion of each audio file.**

   You will see a dialog box for each file you wish to deinterleave or who's sample rate you wish to convert.

5. **Click the Convert or Deinterleave buttons in each file's dialog box.**

   Studio Vision opens a standard Save As dialog box.

6. **Save the converted file.**

   If you are converting a sample rate, the new sample rate will automatically be added as a suffix.

   If you are deinterleaving a file, you will need to save two new files: Left and Right. The L and R will automatically be added as a suffix to the new file names.

7. **After conversion, Studio Vision will ask you if you want to delete the old file.**

8. **If you choose to Delete the file, you will be asked one more time, then the old file will be deleted from your hard disk.**

❑ The Conversion Overview Dialog Box

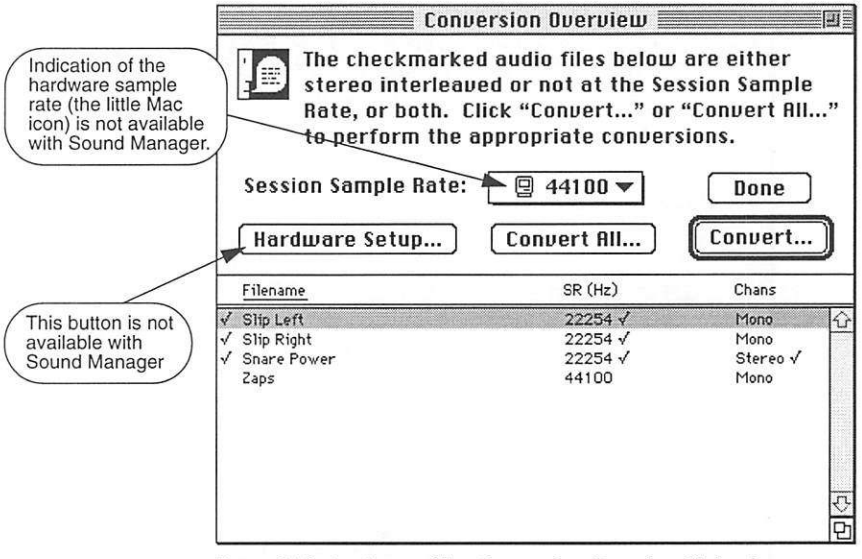


Figure 21.2: Anatomy of the Conversion Overview Dialog Box

You perform file conversions by using the Conversion Overview dialog box. This dialog box will appear automatically whenever you:

- open a Studio Vision document that uses audio files with different sample rates (as could be created in Studio Vision 1.4 and earlier).
- import an audio file that is not using the current Session Sample Rate.
- open a Studio Vision document that uses interleaved stereo audio files and DAE.
- attempt to import an interleaved stereo audio file using DAE.
- choose **Audio>Conversion Overview**.

The File List

Filename	SR (Hz)	Chans
√ Agogo S-50	30000 √	Mono
√ CD Scream S-50	30000 √	Mono
√ Drums	44100	Stereo √
√ Jenni Does It S-50	30000 √	Mono
√ Metropolis	44100	Stereo √
Polar Q	44100	Mono

All audio files that are referenced by the current Studio Vision document appear in a scrolling list in this dialog box. The three columns show information for each audio file:

- the file name
- the sample rate
- whether the file is stereo or mono

You can sort the list by any of these parameters by clicking on the parameter name. Clicking the word **Filename** will sort the list by filename. Clicking **SR (Hz)** will sort the list by sample rate, and clicking the word **Chans** will sort the list into stereo and mono files. The column being sorted is underlined (in the example, the Filename is underlined).

You can select a file in this list by clicking it, or by typing the first letter of the filename.

Audio files that require conversion will have checks next to their names. You can also see which type of conversion they require—a check in the **SR (Hz)** column means that the file must be converted to the Session Sample Rate. A check in the **Chans** column means the file must be deinterleaved.

Session Sample Rate Pop-up

Session Sample Rate: 44100

The Session Sample Rate pop-up menu shows the current session sample rate. You can change the session sample rate by choosing a new value from this pop-up menu. The pop-up menu contains other sample rates supported by your audio hardware as well as any unique sample rates referenced by the sequence file.

When you change the value in this pop-up, the audio files may require different conversions, indicated by the check marks in the list (see "The File List" on page 213).

If you're using DAE, the current hardware sample rate is marked by a Macintosh icon in the pop-up menu. Generally, you should choose this setting. This indicator is not available with Sound Manager.

You can, if desired, set a session sample rate other than one of the ones listed in the pop-up menu. To do so, choose **Other** from the pop-up menu; Studio Vision opens the Set Other Rate Dialog box.

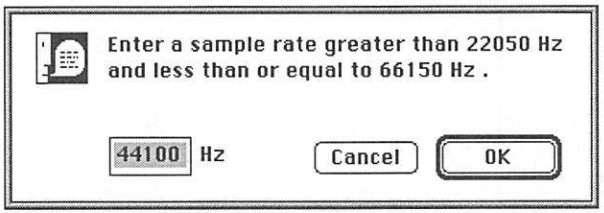


Figure 21.3: Set Other Rate Dialog Box for DAE

Button Descriptions

The following sections discuss each button in the conversion overview dialog box.

Hardware Setup Button (DAE Only)

Hardware Setup...

If you're using DAE, click this button to open the Hardware Setup dialog box, where you can change the hardware sample rate. Clicking this button is the same as choosing **Audio>Hardware Setup**. This button is not available if you're using Sound Manager.

Done Button

Clicking the **Done** button will cause the Conversion Overview dialog box to disappear. Any conversions you made prior to clicking the **Done** button are kept, but any unconverted files remain unconverted.

Convert and Convert All Buttons

If the Conversion Overview dialog box has appeared because you have tried to open a file that requires conversion, the **Convert** button will appear, and the **Convert All** button will appear next to it.

If there are no files that require conversion and you have called the Conversion Overview dialog box manually, only the **Done** button will be in this area.

Clicking **Convert** will cause the currently selected audio file to be converted. Clicking **Convert All** will cause all the audio files that require conversion to be converted, one-at-a-time.

PART 5: Menu Reference

CHAPTER 22: The Edit Menu

Edit	
Undo Record	⌘Z
Cut Selection	⌘X
Copy Selection	⌘C
Paste Selection	⌘V
Clear Selection	⌘B
Merge Selection	⌘M
Insert Clipboard	⌘N
Repeat Paste...	opt;
Clone	⌘=
Get Clipboard Times	⌘`
Insert Blank Time	⌘H
Delete Selected Time	⌘D
Move Events...	⌘,
Combine Tracks	⌘U
Capture Seq->Track	⌘K
Make Subsequence	optU
New Record Track	⌘R

Figure 22.1: The Edit Menu

Studio Vision's **Edit** menu commands affect audio, MIDI, and Strip Chart data, and often function similarly on audio events as on MIDI events.

NOTE: Just like editing MIDI events, all editing of audio events can be performed in real time (though there may be a slight time lag between editing and playback). For example, you may want to loop a range of a track and—during playback or record—edit both audio and MIDI events, listen to the changes as the range loops, then continue editing until you're satisfied.

A major difference between using **Edit** menu commands to edit audio or to edit MIDI is how you select events. You can select a portion of an audio event to edit; whereas, you cannot select only part of a note.

This chapter discusses some of the differences you'll encounter between using **Edit** menu commands with MIDI and with audio events. Please be sure to read your Vision Reference Manual for details about all of these commands.

Also, as discussed in "Waveform Display Options" on page 118, you have three different options of how you'd like to display audio event waveforms. Most likely, you'll find that choosing **High Resolution** allows you to perform graphic edit procedures with the most precision. You must be zoomed in a sufficient amount for **High Resolution** to clearly display all peaks and valleys of the waveform.

You can undo all edit operations by choosing **Edit>Undo**.

NOTE: To edit actual audio data (for instance, to delete pops and clicks) you can use the **Audio>Edit Event Soundfile** command to open a suitable sample editing program. For more information, see "Edit Event Soundfile" on page 241.

❑ Cut

As discussed in the Vision Reference Manual, you can cut sequences, tracks, and events. When you're working with audio, you can also cut portions of events. To cut a portion of an audio event:

1. **Select a portion of an audio event as discussed in "Selecting Audio Events" on page 121.**

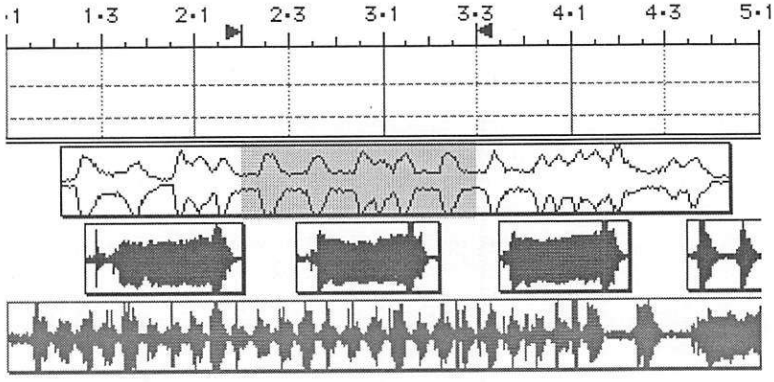


Figure 22.2: Audio Selection in the Graphic Window

2. **Play the selection to verify that it's what you want to cut by choosing Do>Play Selection.**
3. **Choose Edit>Cut Selection.**

   The selection is cut to the Clipboard and information on either side of the cut remains stationary, thus becoming independent audio events.

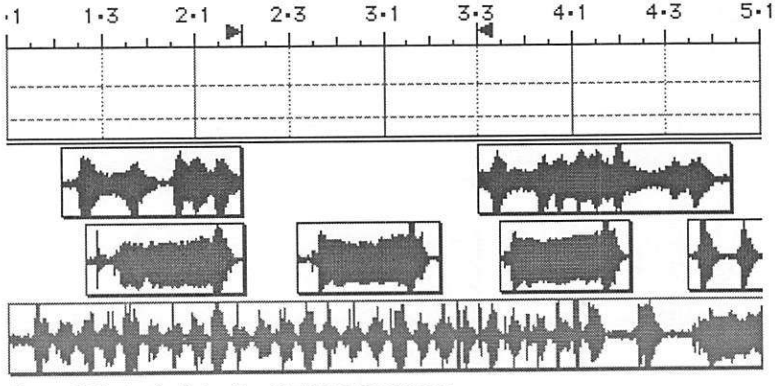


Figure 22.3: Audio Selection Cut from Sequence

You can paste or merge a cut selection to another location in the track, or to another track or sequence.

The **Cut** command is non-destructive. The removed data remains on your hard disk unless you compact or delete the file.

❑ Copy & Paste

To copy a range of an audio event:

1. **Select the range you want to copy either by dragging over it in the Graphic window or setting the selection range in the List window or clicking the selector dots of specific events.**
2. **Play the selection to verify that's what you want to copy.**
3. **Choose Edit>Copy Selection.**

   The selection is copied onto the Clipboard. You can paste or merge the copied selection to another location in the track, or into another track or sequence.

To paste the selection:

1. **Set an insert point by clicking in the audio pane or setting the start selection time in the List window.**
2. **Choose Edit>Paste Selection.**

   The selection is pasted from the Clipboard at your insert start time and extends the length of the original selection.

IMPORTANT: Paste replaces any preexisting information in the insert range with the selection pasted into it. If you want to add information to preexisting information, use the **Merge** command (as discussed in "Merge" on page 223.

You can also copy audio events over portions of other audio events, "shingling" the events to create a stuttering effect. This is discussed in "Creating "Stuttering" Effects" on page 268.

❑ Clear

Clear functions similarly to the **Cut** command, but it removes the selection without placing anything on the Clipboard. You cannot paste or merge events that you clear. You can, however, undo a clear.

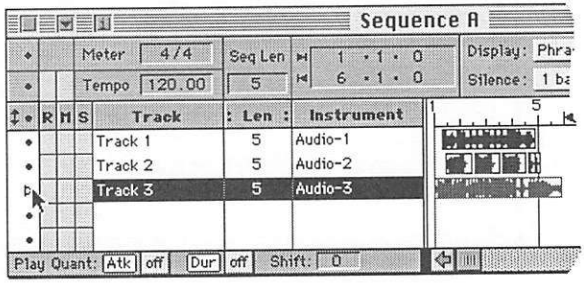
Merge

Merge incorporates your cut or copied audio selection with whatever information is in the insert range; it does not delete any preexisting audio data from the same range.

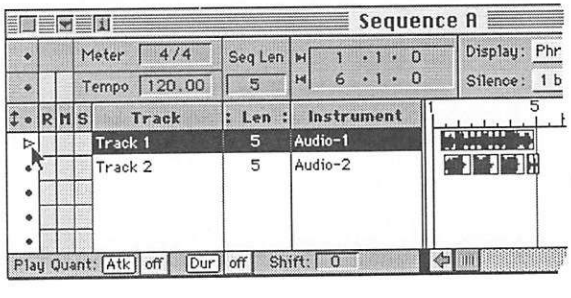
Audio events merged into the same time range will play back simultaneously if they are assigned to different Audio Instruments.

To merge one track with another:

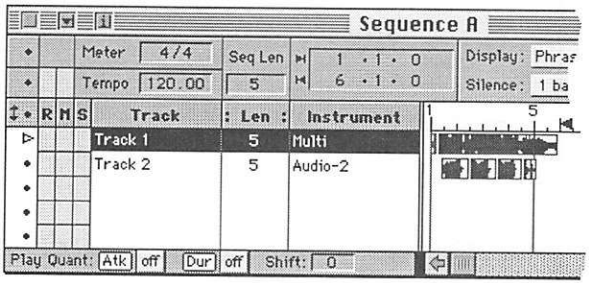
1. **In the Tracks window, click the selector dot of the track you want to merge into another track.**



2. **Choose either Edit>Cut Track or Edit>Copy Track.**
3. **Click the selector dot of the track you want to merge the cut or copied track into.**



4. Choose **Edit>Merge Into Track.**



The audio events from the two tracks merge to become one track. If the two tracks use different Audio Instruments (as in this example), the merged track becomes a Multi Instrument track containing both Audio Instruments.

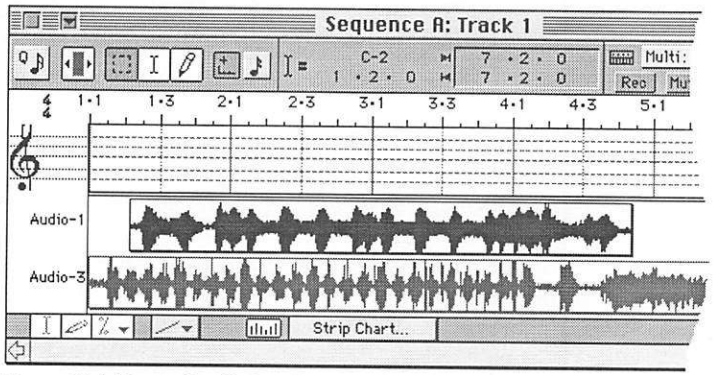


Figure 22.4: Merge Results in a Track with Multiple Audio Instruments

NOTE: Don't confuse the **Edit>Merge** command with the **Audio>Mix Audio** command. **Merge** places selected audio or MIDI events into the same time range; **Mix Audio** creates new wavedata by mixing down audio that selected events point to.

❑ Delete Selected Time

This command deletes audio events and time from your selection. If you included MIDI events in your selection, they will be deleted also.

Delete Selected Time will move remaining audio events next to each other to fill the gap the deleted section left. The events deleted are placed on the Clipboard from which they may be pasted or inserted elsewhere.

❑ Capture Seq —> Seq/Track

Capturing functions on audio as well as on MIDI.

Studio Vision allows you to mix audio at the same time as you capture the sequence. Simply check the **Audio>Mix Audio on Capture** option, select the desired sequence, copy it, select the destination sequence or track, then choose **Capture Seq —> Seq** (or **Track**). This technique is discussed in detail in "Capturing a Mix" on page 188.

Capturing is a process that copies a sequence to another sequence or to a track and reinterprets the timing of data in real time so that data is stored in a chronological stream of events. Capturing is a necessary process before exporting a file to MIDI file format, since data must be in a serial format, and capturing is good if you want to edit the same time range in multiple tracks. Capturing is also good for speeding up chasing, since data is in a more easily readable form.

Multiple Instruments on tracks get disunited and each Instrument goes to the track corresponding to its channel. Tracks with the same Instrument go onto the same, single track. For more information about Capturing, see your Vision Reference Manual.

CHAPTER 23: The Windows Menu

Windows	
Sequences	optQ
Tracks	optS
List	optD
Graphic	optE
Notation	optN
Instruments	optI
Audio Instruments	optJ
Quantize	optG
Names	optP
Input Map	optM
MIDIKeys	optK
Faders	optF
Control Bar	optA
Record Monitor	optW
Players & Queue	

Figure 23.1: The Windows Menu

Studio Vision adds two new items to the Windows menu (as discussed in your Vision Reference manual). These two items open the Audio Instruments window and the Record Monitor window, and are discussed briefly in the following sections.

❑ Record Monitor

Choose this command to open the Record Monitor window. The appearance of the Record Monitor window varies depending on the audio hardware you use.

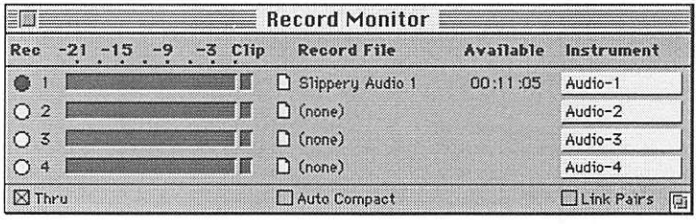


Figure 23.2: Record Monitor Window for Typical 4-track DAE System

The Record Monitor window has numerous functions, including:

- Preview and set audio record levels.
- Designate an audio file (or files) on which you want to record.
- Record enable various audio inputs.
- View available recording times.
- Set the recorded audio event's playback instrument.

There are many other useful and important aspects of this window. To learn more about the Record Monitor window and recording digital audio, see one of the following chapters (depending on the digital audio management system you're using):

- If you're using Studio Vision with Apple's Sound Manager, see "Chapter 6: Recording Audio with Sound Manager" for more information about the Record Monitor window.
- If you're using Studio Vision with Digidesign's Audio Engine (DAE), see "Chapter 11: Recording Audio with DAE" for more information about the Record Monitor window.

❑ Audio Instruments

Choose this command to open the Audio Instruments window. The appearance of the Audio Instruments window varies depending on the audio hardware you use.

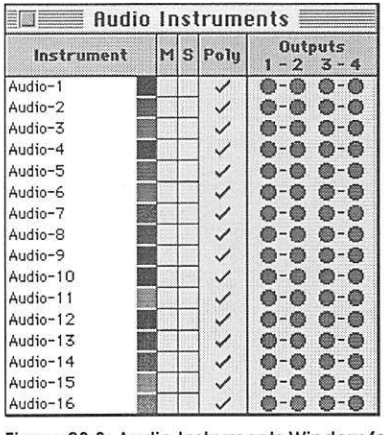


Figure 23.3: Audio Instruments Window for Typical 4-Track Audio System

The Audio Instruments window has numerous functions, including:

- Assigning Audio Instruments to hardware outputs.
- Renaming Audio Instruments.
- Designating a display color for Audio Instruments.
- Muting or Soloing Audio Instruments.
- Assigning an Audio Instrument to Poly mode.

There are many other useful and important aspects of this window. To learn more about the Audio Instruments window and hardware output assignments, see "Chapter 15: Working with Audio Instruments".

CHAPTER 24: The Audio Menu

Figure 24.1: The Audio Menu

This chapter discusses each of the Audio menu commands. Many of these commands are covered in detail by earlier chapters, though this chapter will give you a general overview of each command before cross-referencing a related chapter.

❑ Retain

When you choose this command, Studio Vision retains only the audio in the selected region and clears all data comprising the rest of the selected audio event(s). Like all edit operations, if you have multiple events in the track, only the events selected will be affected. To use the command:

1. **Select a region of audio you wish to retain.**

   You can select across all audio events for a time region (as shown in this example), or you can select a region of time within a single Audio Instrument. Audio selection techniques are discussed in "Selecting Audio Events" on page 121.

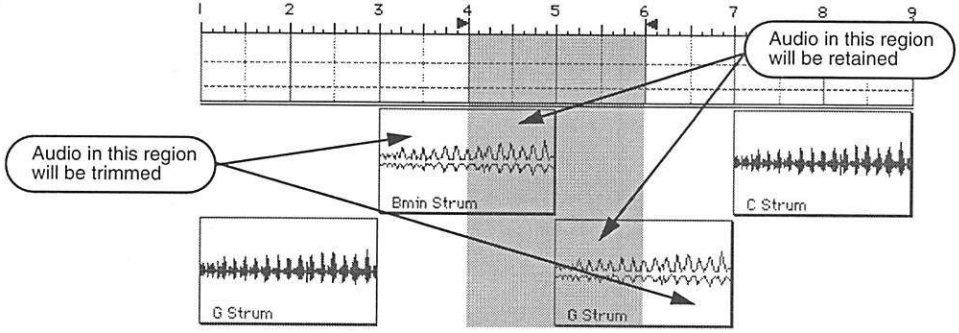


Figure 24.2: Selecting a Region of Audio Events to Retain

2. **Choose Audio>Retain.**
   Studio Vision clears the data in any selected audio events that appear outside the selection region.

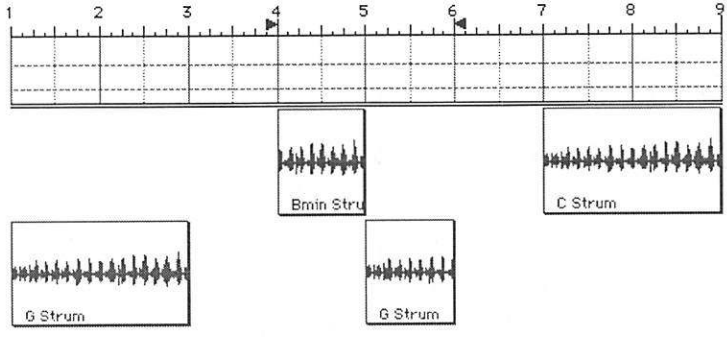


Figure 24.3: Retained Audio

The **Retain** command can be undone since it does not actually remove data from your hard disk; rather is simply removes the track's pointer to that data. Also, you can lengthen any audio events that were automatically trimmed by the **Retain** command (as discussed in "Trimming or Lengthening Audio Events" on page 136).

NOTE: As with other edit operations, you'll most likely want to display the waveform in High Resolution mode when you use the **Retain** command—this lets you see more clearly the peaks and valleys of the waveform. For more information, see "Waveform Display" on page 251.

❑ Separate

Audio events can be broken up into as many pieces as you want so you can easily manipulate portions of the sound. For instance, perhaps you have a speech track and you want to rearrange the words. You can separate the words into individual events in order to move or edit them.

You can separate an event into multiple events in one of two ways.

- You can split an audio event at the edit point.
- You can separate a section of an audio event from the rest of the event.

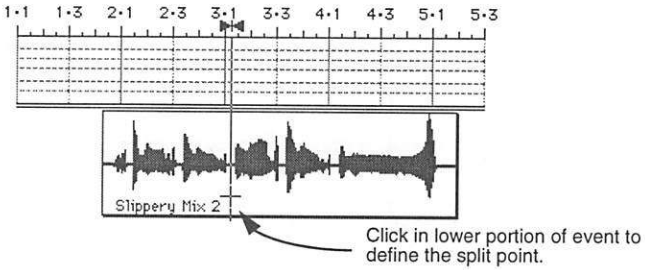
To split an audio event:

1. **In the Graphic window, select either the Marquee or I-Beam tool.**

Figure 24.4: Marquee and I-Beam Tools

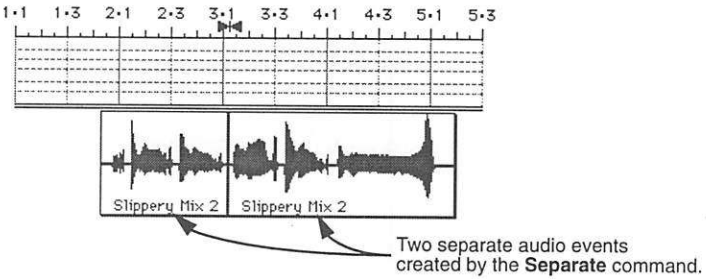
2. **Move the cursor over the event's lower select region and click at the desired split point.**

   The cursor becomes a cross-hair. If you click the cursor over the top region of an audio event, you'll select the entire event—this is not what you want to do. Make sure you click in the bottom region of the event.



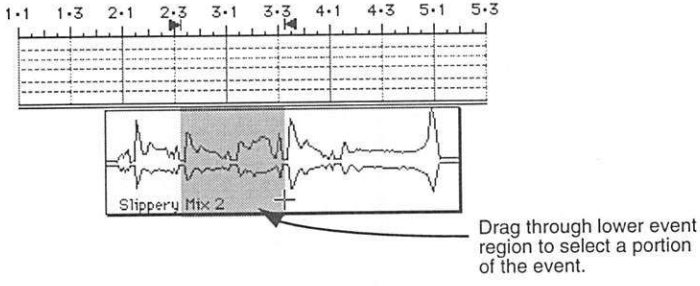
3. **Choose Audio>Separate.**

   Studio Vision separates the original audio event into two audio events (separated at the edit point).



To separate a section of an audio event from the rest of the event:

1. **In the Graphic window, select either the Marquee or I-Beam tool.**
2. **Drag across the portion of the audio event that you want to separate from the rest of the event.**



3. **Choose Audio>Separate.**
   Studio Vision divides the event into individual events.

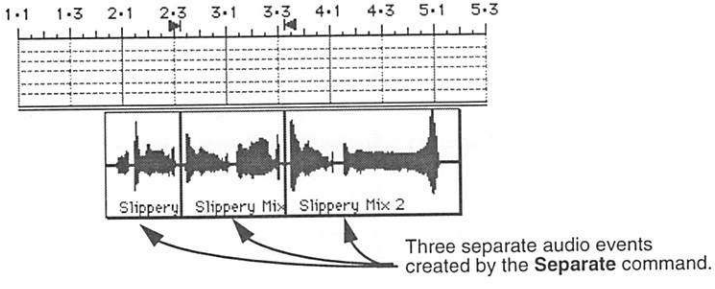


Figure 24.5: Audio Event Separated

Notice that no audio event information is deleted. You can play back the track and it will sound just as it did before you performed the separation.

NOTE: As with other edit operations, you'll most likely want to display the waveform in High Resolution mode when you use the **Separate** command—this lets you see more clearly the peaks and valleys of the waveform. For more information, see "Waveform Display" on page 251.

❑ Strip Silence

Use this command to remove ("gate") any selected audio that falls below a specified amplitude threshold for a specific amount of time. When you choose this command, Studio Vision opens the Strip Silence dialog box.

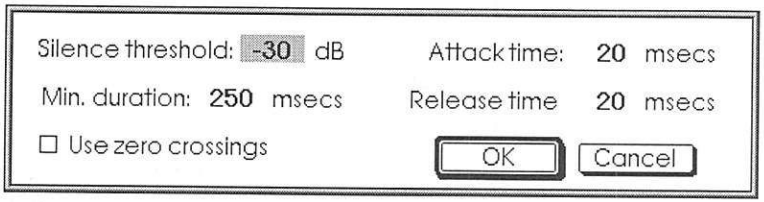


Figure 24.6: Strip Silence Dialog Box

Use the Strip Silence dialog box to define what Studio Vision sees as "silence." The **Strip Silence** command is a very useful feature for a number of reasons:

- You can remove unwanted noise that occurs below the lowest threshold of recorded audio (for example, analog tape hiss).
- You can break up one long audio event into separate short audio events in order to work with the audio more easily.

  Doing this has many benefits, including:

  a. You can easily copy and paste small sections of audio (such as a particular drum sound, or an oft-repeated vocal line).

  b. You can quantize individual events (such as separate drum hits in a recorded drum track).

  c. If you're syncing to tape and are playing back digital audio using only the session sample rate (as is required with Sound Manager), breaking audio into smaller events means there is less likelihood of digital audio drifting "out-of-sync" with audio on tape.
- It's a fast way to clear silent passages from your audio events.

To learn about the Strip Silence dialog box and how to gate audio with the Strip Silence command, see "Chapter 18: Gate Audio with Strip Silence".

❑ Mix Audio

Use this command to mix together digital audio from anywhere within a sequence—Studio Vision examines the selected audio files and calculates a new, mixed audio file.

This command mixes together selected audio events and their velocity settings. If you select to mix over a range of time, then any volume and pan controllers assigned to Audio Instruments within that time region will be incorporated into the new mixed audio file.

The **Mix Audio** command lets you mix the following:

- audio from multiple tracks
- audio on multiple Instruments within tracks
- entire audio events
- sections of audio events

To learn about mixing audio, see "Chapter 19: Mixing Digital Audio". To learn specifically about the **Mix Audio** command, see "Direct Audio Mixing" on page 181.

❑ Import Audio

Use this command to import audio from another source into your Studio Vision sequence file. The importing procedure is different depending on whether you use DAE or Sound Manager.

Importing Audio with DAE

NOTE: This section discusses the **Import Audio** command when used with DAE. If you're using Studio Vision with Apple's Sound Manager, see "Importing Audio with Sound Manager" on page 238.

You can import audio files from various sources that use any of the following file formats:

- Sound Designer
- Sound Designer II
- AIFF
- Dyaxis

You can import audio recorded at any sample rate. Eight bit files cannot be imported. Stereo interleaved files must be deinterleaved before playing (see "Chapter 21: Sample Rate Conversion and Deinterleaving").

The **Import Audio** command is accessible if a Graphic or List window is open, or if you click in the Track Overview area of the Tracks window. The open window tells Studio Vision which track to import the audio into and at what time it should play.

When you choose this command, Studio Vision opens a standard DAE Import Audio dialog box.

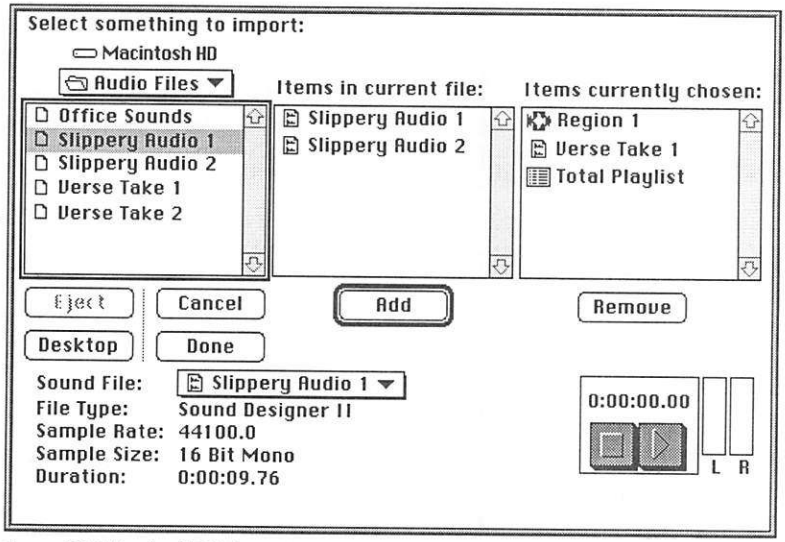


Figure 24.7: Typical DAE Import Audio Dialog Box

For detailed information about how to import audio into Studio Vision using DAE, see "Chapter 12: Importing Audio Files with DAE".

Importing Audio with Sound Manager

> **NOTE**: This section discusses the **Import Audio** command when used with Sound Manager. If you're using Studio Vision with DAE, see "Importing Audio with DAE" on page 237.

You can import audio files from various sources that use any of the following file formats:

- Sound Designer II
- AIFF

The **Import Audio** command is accessible if a Graphic or List window is open, or if you click in the Track Overview area of the Tracks window. The open window tells Studio Vision which track to import the audio into and at what time it should play.

When you choose this command, Studio Vision opens the Import Audio dialog box.

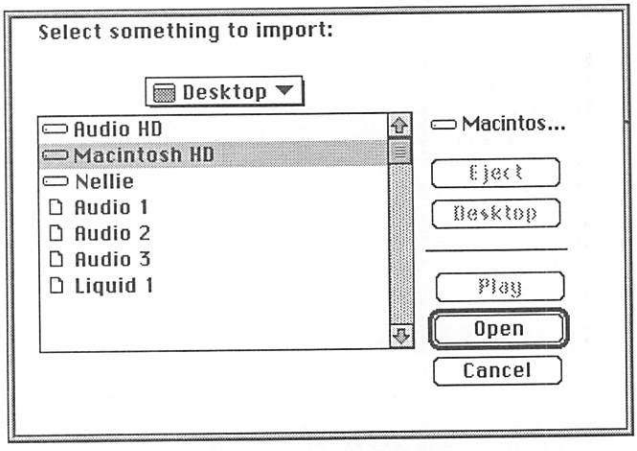


Figure 24.8: Typical Sound Manager Import Audio Dialog Box

For detailed information about how to import audio into Studio Vision using Sound Manager, see "Chapter 7: Importing Audio Files with Sound Manager".

❑ Get Event Info

Choose this command to get information about an audio event. When you choose **Audio>Get Event Info**, Studio Vision opens the Audio Event Info dialog box.

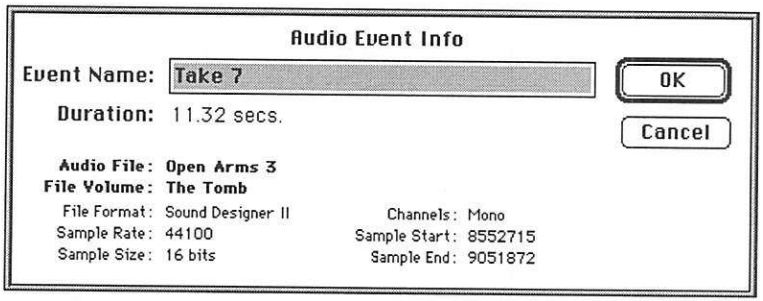


Figure 24.9: Audio Event Info Dialog Box

The Audio Event Info dialog box is a convenient, quick way to look up specific information about any audio event. It's also an easy way to rename an event from within the Graphic window.

The Audio Event Info Dialog box contains the following information:

- **Event Name** displays the name of the selected audio event. You can use this field to change the name of the event, if desired.
- **Duration** shows duration of the audio event.
- **Audio File** displays the name of the audio file that the event references.
- **File Volume** displays the hard disk on which the audio file resides.
- **File Format** is the file format in which the audio file is stored.
- **Sample Rate** is the sample rate at which the audio in the file was recorded.
- **Sample Size** is the resolution of the file, in bits.

- **Channels** shows you whether the event's file is mono or stereo. If the audio event is part of a *linked* stereo file, then the dialog box displays information about both the left and right channels of the audio event.

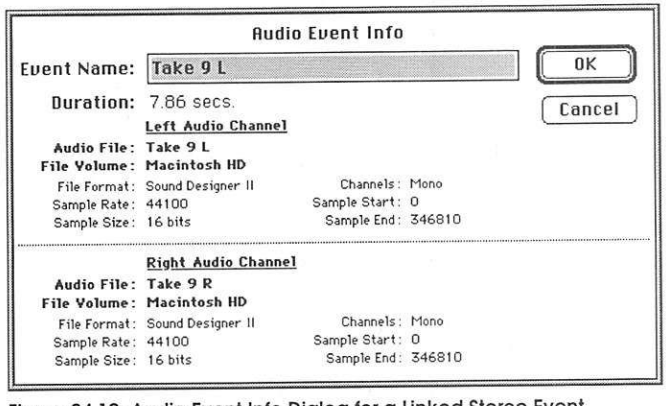


Figure 24.10: Audio Event Info Dialog for a Linked Stereo Event

- **Sample Start** and **Sample End** display the sample number at which the audio event begins and ends in the wavedata portion of the audio file.

SHORTCUT: You can open the Audio Event Info dialog box directly from the Graphic window by clicking the event name in the lower left corner of any audio event (**Audio>Display Names** must be enabled). When you move the cursor over an event name in the Graphic window, it turns into a question mark. Click with the question mark cursor and the Audio Event Info dialog box opens for that event.

❑ Edit Event Soundfile

Choose this command to launch a sample editing program that will open to display the selected audio file. The program that opens depends on whether you're using DAE or Sound Manager.

TIP: If you hold down the Option key when you choose this command, you can open a sample editing program that's different than the last program you used.

Edit Event Soundfile with DAE

NOTE: This section discusses the **Edit Event Soundfile** command when used with DAE. If you're using Studio Vision with Apple's Sound Manager, see "Edit Event Soundfile with Sound Manager" on page 244.

Choose this command to open Sound Designer II so you can process the actual sound data you recorded using Studio Vision. All audio in the selected event's audio file will be displayed in Sound Designer II's Waveform Editing window, and the event, or portion of it, that you selected in Studio Vision will be highlighted (if you're using Sound Designer II version 2.6 or better).

IMPORTANT: It is up to you to know how to use Sound Designer II. If you're unfamiliar with sound processing, it is very possible that you will disrupt your wavedata—and your sequence—by shifting wavedata in time or by editing outside of the selection region. Read the user's manual that came with Sound Designer II if you haven't done so.

All Studio Vision editing operations (except **Compact** and **Delete File**) are non-destructive. Editing sound files in Sound Designer, however, is a destructive process. If you edit a soundfile and you don't like your edit, you'll have lost your original data unless you made a backup copy of the original file.

Using Edit Sound File

You can select an entire audio event for editing, or just a portion of one.

1. **Select an entire audio event in Studio Vision by clicking anywhere in its upper select region.**

   Alternately, you could select a portion of an audio event by clicking in its lower select region and dragging with the Marquee or I-Beam.

2. **Choose Audio>Edit Soundfile.**

   If this is the first time you're using this command, you will be prompted with a dialog box to locate Sound Designer II. In the future, Studio Vision will remember where it is, unless you move it. If, at some later time, you want to open a different sample editing program with this command, hold down the option key when you choose it.

   If Sound Designer II is already running, it will become the active application.

   Sound Designer II's Waveform Editing window opens to display all audio in the selected event's audio file.

   If you're editing a linked stereo audio event, Sound Designer II will open two Waveform Editing windows, one for the left and one for the right channel.

IMPORTANT: With other programs or earlier versions of Sound Designer II, Studio Vision may not be informed of the changes and, therefore, be unable to automatically recompute the waveform summary. If you do not see the changes you made in Sound Designer II reflected in Studio Vision (or if you are unsure these changes are reflected), use the **Rebuild Waveform** command in the File Management dialog box.

All audio in the selected audio event's audio file will be displayed as one long waveform, since the concept of "audio events" is unique to Studio Vision.

The only way you have of determining from this waveform where the boundaries of your selected audio event are is the highlighted area in the Waveform Editing window.

Do not edit outside this highlighted area; if you do you'll cross over the boundaries of the audio event (or portion of it) that you wanted to edit.

NOTE: In order to avoid accidental loss of the current selection range, you can save it in Sound Designer II as a Region. As soon as you enter Sound Designer, use the **Capture Region** command.

Don't perform any operations that move wavedata, such as a cut or paste. If you cut out a portion of audio from the file, for example, then everything in the file that's to the right of the cut will shift to fill the gap. The references in the Studio Vision sequence file of where on the hard disk it should play back from will be inaccurate. Audio events that reside in this file may not play back correctly.

You can safely perform these operations in Sound Designer II:

- Fade in
- Fade out
- Normalize
- Revert
- EQ (Equalize)

Edit Event Soundfile with Sound Manager

NOTE: This section discusses the **Edit Event Soundfile** command when used with Sound Manager. If you're using Studio Vision with DAE, see "Edit Event Soundfile with DAE" on page 242.

Choose this command to open Opcode's Audioshop so you can process the actual audio data you recorded in Studio Vision. It's up to you to know how to use Audioshop. Read your Audioshop manual if you haven't done so.

Using Edit Sound File

To use the Edit Soundfile command with Sound Manager:

1. **Select an audio event in Studio Vision by clicking anywhere in its upper select region.**
2. **Choose Audio>Edit Soundfile.**

   If this is the first time you're using this command, you will be prompted with a dialog box to locate Audioshop. In the future, Studio Vision will remember where it is, unless you move it. If, at some later time, you want to open a different sample editing program with this command, hold down the option key when you choose it.

   Audioshop will open allowing you to edit the entire audio file that contains the selected audio event.

   If Audioshop is already running, it will become the active application, but no new file is opened—your selection is not communicated to Audioshop.

IMPORTANT: If you don't see the changes you made in Audioshop reflected in Studio Vision (or if you are unsure these changes are reflected), use the **Rebuild Waveform** command in Studio Vision's File Management dialog box.

❑ Link Events

Choose this command to link two selected mono events into a single linked stereo event. The two events being linked must share the same Start and End times. You should select the two events that you want to link from within the Graphic window—this way you can see the two events and easily tell whether they share the same Start and End times. If the Start and End times are not exactly the same and you still wish to link the two events, you can make them the same by using the **Retain** or **Cut** commands. If you try to link events with different Start and End times, Studio Vision will warn you that they are not the same.

NOTE: Link Events works only on the first two selected audio events in the currently selected track. This is different than the **Unlink Events** command (discussed below), which works on all selected events in all selected tracks.

❑ Unlink Events

Choose this command to unlink all selected events that are currently linked. This is particularly useful if you've recorded a linked stereo event, then decide later that it doesn't need to be stereo. After a stereo event has been unlinked, you may wish to delete one of the two resulting audio events in order to free up an additional playback channel. Deleting the audio event does not delete the disk space that was used by it—for that you must use the File Management dialog box.

File Management

Choose this command to open the File Management dialog box.

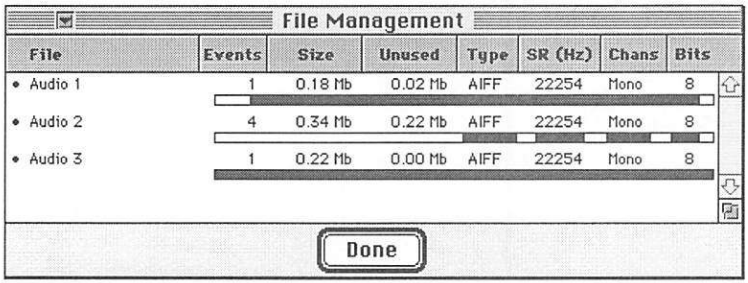


Figure 24.11: Typical File Management Dialog Box

This window contains information about each audio file used by the active Studio Vision document. Since each Studio Vision document may use a different group of audio files, the File Management dialog box displays only the audio files used by the Studio Vision document that's currently open.

In addition, the File Management dialog box allows you to see how much of an audio file is unused by the active Studio Vision document and, if desired, delete the unused data from your disk by compacting the file.

There are many useful operations that can be performed from within the File Management dialog box. To learn about files and the File Management dialog box, see "Chapter 20: File Management".

Conversion Overview

Choose this command to open the Conversion Overview dialog box.

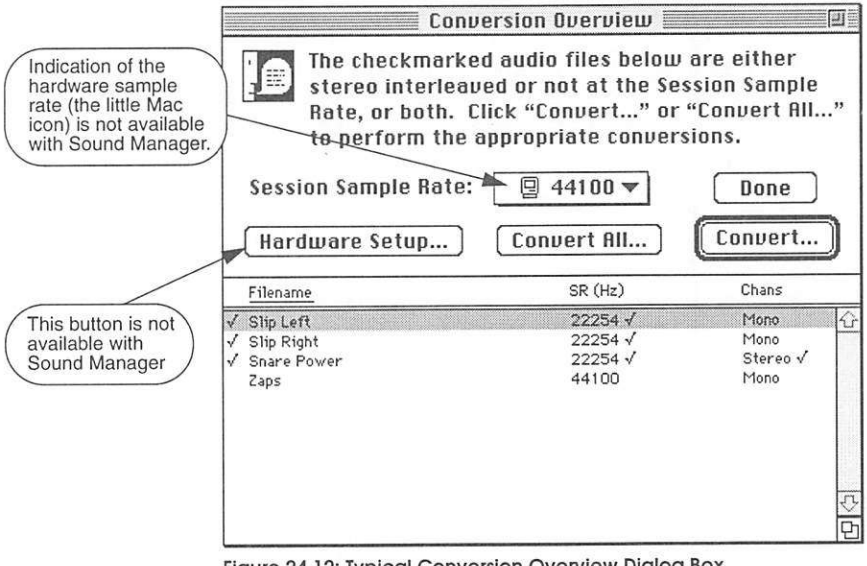


Figure 24.12: Typical Conversion Overview Dialog Box

Use this dialog box to convert audio files to a common session sample rate and to convert interleaved stereo files to DAE-compatible linked mono files. Generally, you will not need this command (or dialog box) unless you are converting Studio Vision 1.4 or earlier files to use with Studio Vision 2.0. This dialog box appears whenever you:

- open a Studio Vision document that uses audio files with different sample rates (as could be created in Studio Vision 1.4 and earlier).
- import an audio file that is not using the current Session Sample Rate.
- open a Studio Vision document that uses interleaved stereo audio files and DAE.
- attempt to import an interleaved stereo audio file using DAE.
- choose **Audio>Conversion Overview**.

The Conversion Overview dialog box is discussed in detail in "Chapter 21: Sample Rate Conversion and Deinterleaving".

❑ Buffer Size

Choose this command to open the RAM Buffer Size dialog box. The appearance of the dialog box changes depending on whether you use Studio Vision with DAE or with Sound Manager.

Use the RAM Buffer Size dialog box to tell Studio Vision how much memory to set aside for use as a digital audio RAM buffer. Studio Vision uses the RAM buffer to store digital audio temporarily before sending it to your hard disk, or before playing it.

To learn more about setting a buffer size and using the RAM Buffer Size dialog box, see one of the following chapters (depending on the digital audio management system you're using):

- If you're using Studio Vision with Apple's Sound Manager, see "Allocating RAM to the Digital Audio RAM Buffer" on page 26.
- If you're using Studio Vision with DAE, see "Allocating RAM to the Digital Audio RAM Buffer" on page 70.

❑ Sample Rate

Choose this command to open the Set Session Sample Rate dialog box.

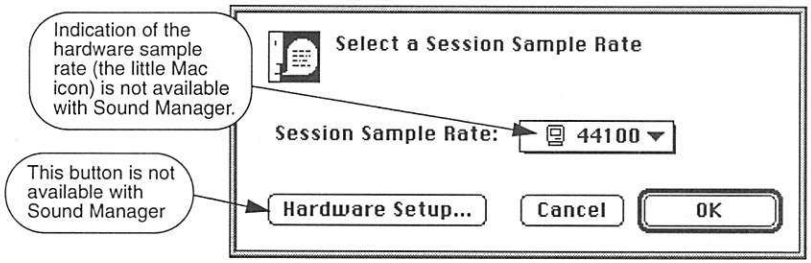


Figure 24.13: Set Session Sample Rate Dialog Box

Use the dialog box to set a session sample rate before you record. The session sample rate is the sample rate that Studio Vision uses to both record and play back audio.

Higher session sample rates produce better audio quality, but use more disk space (because there are more sample points per second). You can save disk space by using a low sample rate, but this degrades the sound quality.

To get the best audio quality, you should record all of your sound files at the same rate as your hardware sample rate. When you do this, the sample rates of your files will always match the hardware sample rate, and sample rate conversion on playback will not be necessary.

To learn more about sample rates and the Set Session Sample Rate dialog box, see one of the following chapters (depending on the digital audio management system you're using):

- If you're using Studio Vision with Apple's Sound Manager, see "Set a Session Sample Rate" on page 33.
- If you're using Studio Vision with DAE, see "Set a Session Sample Rate" on page 75.

❑ Hardware Setup

Choose this command to open the Hardware Setup dialog box. The appearance and function of the dialog box changes depending on whether you're using Studio Vision with DAE or with Sound Manager.

Use this dialog box to tell Studio Vision about the audio hardware you're using.

This process is quite different depending on whether you use DAE or Sound Manager. For more information, see one of the following chapters (depending on the digital audio management system you're using):

- If you're using Studio Vision with Apple's Sound Manager, see "Set Up the Audio Hardware" on page 28.
- If you're using Studio Vision with DAE, see "Set Up the Audio Hardware" on page 72.

❑ Audio System

Choose this command to open a submenu of Audio System choices.

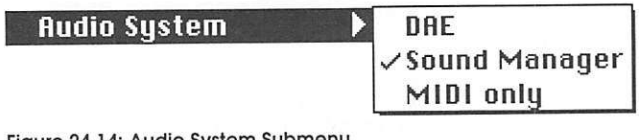


Figure 24.14: Audio System Submenu

The audio system you choose depends on your audio hardware.

- **DAE**: Select this option to use Studio Vision with any professional Digidesign digital audio hardware. Digidesign hardware uses an audio system called the Digidesign Audio System (DAE). If you select this system and DAE is not available, Studio Vision will use Sound Manager instead.
- **Sound Manager**: Select this option to use Studio Vision with the Macintosh's built-in audio or with audio hardware that supports Apple's Sound Manager.
- **MIDI only**: Select this option if you are using Studio Vision strictly as a MIDI sequencer and are not recording or playing digital audio files.

There are many differences between using Studio Vision with DAE and with Sound Manager. Because of this, some Studio Vision operations are described twice in this manual; once for DAE and again for Sound Manager. You need only read the discussions that relate to the audio system you're using.

❑ Waveform Height

Use this submenu to select the height of the audio events displayed in the Graphic window.

Figure 24.15: Waveform Height Submenu

Choose one of the four options in the **Audio>Waveform Height** submenu to set the waveform height. Your choices are:

- **Tall**: This display option displays the most detail, but takes up the most amount of space in the Graphic window's audio pane.
- **Medium**: This display option provides a trade-off between vertical detail and audio pane space.
- **Tiny**: This display option shows very little detail, but requires very little space in the Graphic window's audio pane.
- **Automatic**: Studio Vision selects an event height based on the number of audio events in the window.

❑ Waveform Display

Use this submenu to select the display resolution of waveforms as displayed in the Graphic window.

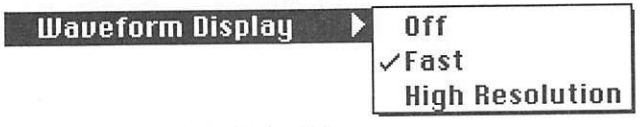


Figure 24.16: Waveform Display Submenu

Choose one of the three options in the **Audio>Waveform Display** submenu to set a waveform display resolution. The three waveform display options are:

- **Fast**, which allows Studio Vision to redraw waveforms fairly quickly, a useful feature during recording sessions.
- **High Resolution**, which—*if you are zoomed in enough*—displays waveforms in greater detail than **Fast** mode, showing clearly the peaks and valleys of the waveform, a useful feature during editing procedures.
- **Off**, which displays a waveform as a rectangular bar. This takes Studio Vision virtually no time to draw and is useful if you want to work extremely quickly and viewing the waveform is not a concern.

Each of the options is discussed in detail in the following sections.

Off

You'll notice immediately after recording that it takes time for Studio Vision to compute the wavedata summary. If you want to time during recording sessions, you can disable all computation of the summary by disabling the waveform display. To do this, check **Off** in the **Audio>Display Waveform** submenu. Audio will be represented as rectangular bars in the Audio Instrument's color, which take Studio Vision virtually no time to draw.

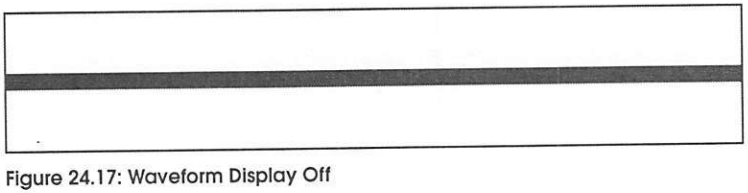


Figure 24.17: Waveform Display Off

You can perform editing operations on audio bars if you don't care about viewing the waveform. However, **Strip Silence** is not possible.

Fast

Checking **Fast** allows Studio Vision to redraw waveform displays fairly quickly, which is especially desirable when you're recording or playing back audio.

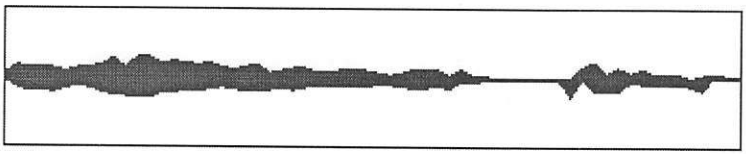


Figure 24.18: Fast Waveform Display

The waveform display has a blockier appearance than in High Resolution mode (discussed in the following section).

Studio Vision creates a summary for all audio data and displays waveforms based on this summary. The summary consists of the minimum and maximum of every group of 256 samples in the audio file, truncated to 8 bits. The summary is stored as a resource with the audio file. In Fast mode, Studio Vision displays a summary of audio data rather than the actual data stored on your hard disk.

High Resolution

Checking **High Resolution** allows Studio Vision to display the actual waveforms, which is desirable when you're editing and need to clearly see all peaks and valleys.

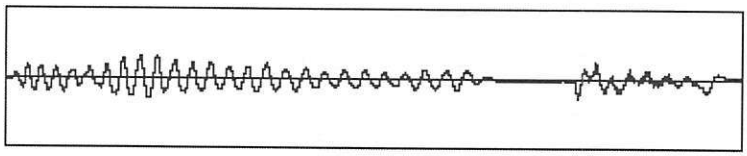


Figure 24.19: High Resolution Waveform Display

You must be zoomed in a lot—displaying less than 256 samples per pixel (the resolution of the audio summary)—in order for the High Resolution option to display a waveform more detailed than the Fast mode waveform. Since tempo is bar based, the greater the tempo, the more you'll be able to zoom in; so tempo works in conjunction with the amount you're zoomed in to affect the High Resolution display.

When zoomed in far enough, Studio Vision reads the actual audio data on your hard disk. If you're not zoomed in enough, Studio Vision reads the summary it created of the waveform and displays the waveform the same as it appears in Fast mode.

Redrawing in High Resolution mode is slower than in Fast mode when zoomed in.

IMPORTANT: You may want to raise the tempo in order to be able to zoom in more while using the High Resolution display. However, before you perform any edit operations, make sure you revert the tempo to the desired playback tempo.

❑ Display Names

If the **Audio>Display Names** option is enabled (checked), audio event names are displayed in the lower left corner of the event in the Graphic window. This option does not affect audio event names in the List window (where names are always displayed and can be edited) or the Tracks window (where the waveform is too small to contain any text).

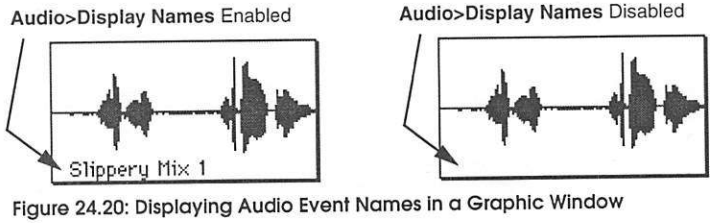


Figure 24.20: Displaying Audio Event Names in a Graphic Window

Initially, audio events default to the name of the referenced audio file (or the region of a Sound Designer II file if you import a region), but you can rename audio events for easier identification. To learn more about naming audio events, see "Renaming Audio Events" on page 119.

❑ Mix Audio on Capture

If the **Audio>Mix Audio on Capture** option is enabled (checked), Studio Vision includes audio data in a capture operation when you choose one of the **Edit>Capture** commands.

For details on how to capture audio into a mix, see "Capturing a Mix" on page 188. There are differences between mixing audio using an **Edit>Capture** command and mixing audio using the **Audio>Mix Audio** command. For details about all digital audio mixing operations, see "Chapter 19: Mixing Digital Audio".

❑ Normalize on Mix

If the **Audio>Normalize on Mix** option is enabled (checked) and you mix digital audio (using either the **Audio>Mix Audio** command or an **Edit>Capture** command), Studio Vision will normalize the mixed audio file's data such that it's maximum amplitude is 0 dB.

Therefore, if the mixed waveform's maximum amplitude is less than 0 dB, Studio Vision will boost the amplitude of the entire waveform. Similarly, if the mixed waveform's maximum amplitude is greater than 0 dB, Studio Vision will reduce the amplitude of the entire waveform to avoid clipping.

For complete instructions about mixing digital audio, see "Chapter 19: Mixing Digital Audio".

TIP: If you recorded an event too softly, you can normalize it by enabling the **Normalize on Mix** option, selecting the event, then choosing **Audio>Mix Audio**. This creates a new file that, if desired, you can use in place of the one you recorded originally. The old file remains on the hard disk and you can choose to delete it if desired.

❑ Audio Preferences

The appearance of the Audio Preference dialog box changes depending on whether you're using DAE or Sound Manager. See "DAE Audio Preferences" on page 255 if you're using DAE. See "Sound Manager Audio Preferences" on page 258 if you're using Sound Manager.

DAE Audio Preferences

NOTE: This section applies only if Studio Vision uses the Digidesign Audio Engine (DAE) as selected from the **Audio>Audio System** submenu. If you're using Sound Manager, read "Sound Manager Audio Preferences" on page 258 instead of this section.

To open the Audio Preferences dialog box, choose **Audio>Audio Preferences**.

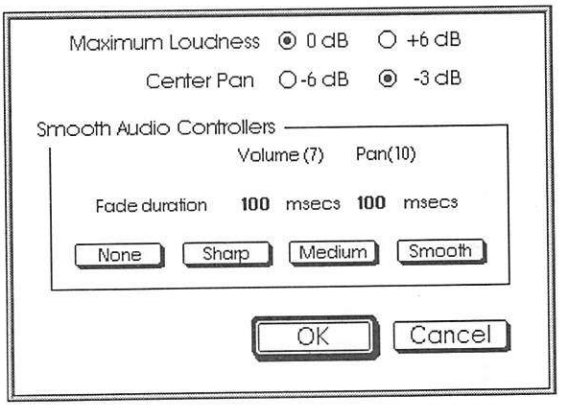


Figure 24.21: Audio Preferences Dialog Box with DAE

As seen in Figure 24.21, there are many elements to the Audio Preferences dialog box. These are discussed in the following sections.

Maximum Loudness

DAE allows you to boost output volumes by 6 dB if desired. If your audio files were recorded at a very low amplitude, you can set this value to +6dB to give all your audio files a +6 dB volume boost.

The problem with boosting the output of all your audio files is that any audio events that contain signals close to the maximum amplitude will get boosted to the point of distortion. Therefore, you should probably use the +6 dB boost only as a temporary solution to low audio volumes.

The best way to achieve the loudest possible volume without distortion is to mix the audio using the **Audio>Normalize on Mix** option (as discussed in "Chapter 19: Mixing Digital Audio"). Then, if you want playback to be at a lower volume, use either a lower velocity value for an event, or use MIDI controller #7 to adjust volume. For more information about setting audio event volumes, see "Chapter 16: Adjusting Volume and Pan".

To obtain the best audio quality, you should leave this setting at 0 dB and record your audio as high as possible without clipping.

Center Pan

This parameter controls how much a stereo signal is attenuated on each side when it is panned to the center. The default value for this parameter is -3dB, because this most accurately reflects the operation of a professional mixing console. Versions of Studio Vision prior to version 1.5 used a -6dB center pan value. Because of this, you may want to use the -6dB setting when you are working with older Studio Vision files. For more information see "Pan Compatibility with Older Versions (DAE Only)" on page 166.

Smooth Audio Controllers

Sudden changes in volume and pan can produce unwanted noise, such as clicks, pops, or "zips." This dialog box gives you a set of parameters to smooth out rapid changes in volume or pan, therefore eliminating these unwanted noises.

The **Fade duration** is the amount of time the smoothing "ramp" will be generated during fast amplitude changes or pans. Fade durations can be set between 0 and 200 ms.

The **None**, **Sharp**, **Medium**, and **Smooth** buttons each provide default volume and pan fade times.

In the example below, consider an audio signal that changes amplitude abruptly:

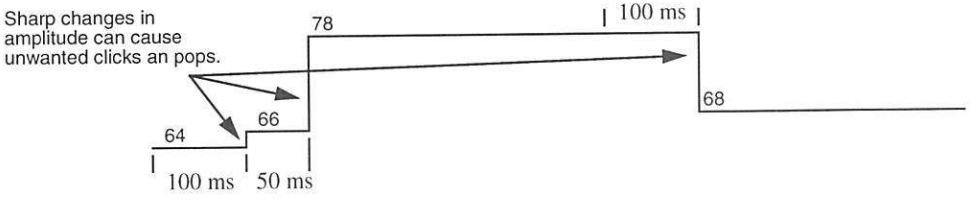


Figure 24.22: Abrupt Amplitude Changes of Original Audio Envelope.

If we set the Fade Duration to 100 ms by clicking the Medium button, Studio Vision will automatically smooth the signal within 100 ms of the amplitude change.

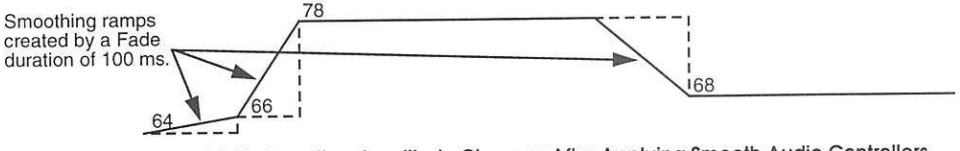


Figure 24.23: Smoother Amplitude Changes After Applying Smooth Audio Controllers

Sound Manager Audio Preferences

NOTE: This section applies only if Studio Vision uses the Apple Sound Manager (as selected from the **Audio>Audio System** submenu). If you're using the Digidesign Audio Engine (DAE), read "DAE Audio Preferences" on page 255 instead of this section.

To open the Audio Preferences dialog box, choose **Audio>Audio Preferences**.

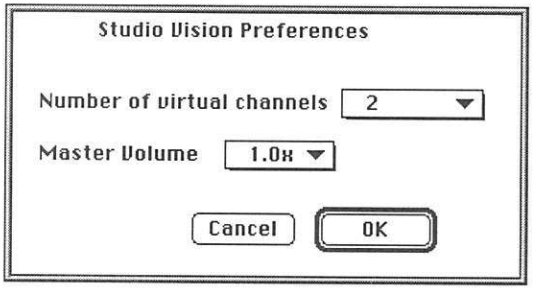
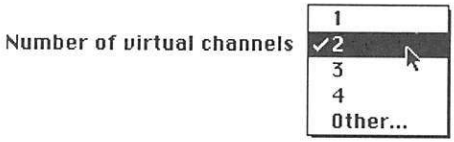


Figure 24.24: Preferences Dialog Box for Non-AV Macintosh

The appearance of the Preference dialog box changes slightly depending on the type of Macintosh you use. The following sections discuss all the various elements in the Sound Manager Audio Preferences dialog box.

Virtual Channels Pop-up Menu

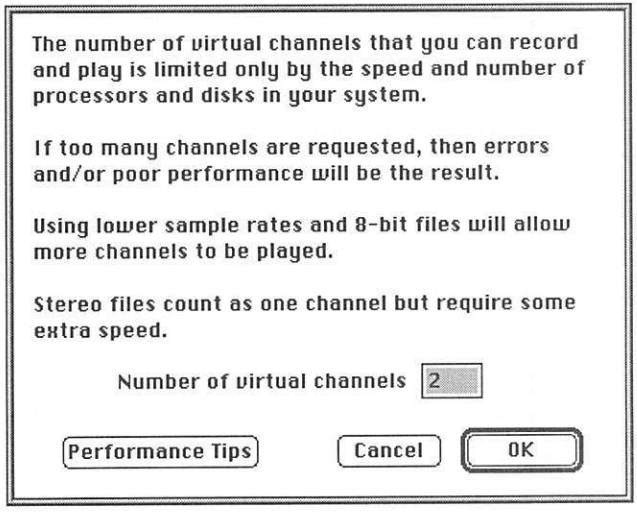
Use the **Number of virtual channels** pop-up menu to select how many channels of audio you want Studio Vision to play back simultaneously.



These channels are called "virtual channels" because they define how many audio events can play simultaneously, not how many actual audio output jacks are on your hardware. For example, a Macintosh with built-in stereo outputs contains only two physical hardware output channels (the left channel and the right channel). However, with a fast enough processor and hard drive, the Macintosh might be capable of playing 3, 4, or even more audio events simultaneously.

The number of virtual channels that you can record and play is limited only by the speed of your processors and hard disks. If you choose more channels than your system can handle, you'll hear poor audio performance and/or recording and playback errors. Interleaved stereo files count as a single channel, but do require additional processor and disk access speeds.

If you select **Other**, Studio Vision opens a dialog box in which you can set from 1 to 16 virtual channels.



Optimizing the Number of Virtual Channels

It's up to you to find the optimum number of virtual channels for your particular hardware. Use the following guidelines as a starting point for selecting the number of virtual channels:

Audio Hardware	Sample Resolution (in bits)	Sample Rate	Virtual Channels
Quadra 840 AV	16	44 kHz	4
Quadra 660 AV	16	44 kHz	3
Quadras (non-AV)	8	22 kHz	4
Mac II class (68030 processors)	8	22 kHz	2
Spectral Innovations NuMedia card (in a Quadra)	16	44 kHz	4

Table 2: Beginning Guidelines for Setting Number of Virtual Tracks

The number of virtual channels that can be played simultaneously is related to the sample resolution and sample rate as well as your processor speed. For example, you can increase the number of virtual channels on a Quadra 840 AV if you decrease either the sample resolution or the sample rate. Decreasing the sample rate from 44 kHz to 22 kHz is often an effective way to gain more virtual channels without sacrificing much audio quality since a 22 kHz sampling rate still results in audio with an 11 kHz bandwidth.

Master Volume Pop-up Menu

Use the Master Volume pop-up menu to select the master playback volume of all audio files.

When you select a master volume, the system scales the playback volume of all audio by the indicated amount. For example, if your digital audio files are all too quiet, you can choose to increase the playback volume of all files by 50% by selecting **1.5x**. Similarly, you can double the playback volume by selecting **2.0x**. If your files are all too loud, you can halve their playback volume by selecting **.5x**. Selecting a master volume of **1.0x** causes all audio files to playback at their actual recorded levels.

Studio Vision does not remember this setting when you quit the application. This is because it's considered a temporary solution to adjusting audio playback volumes. Adjusting volume in this way will often cause the audio to sound distorted.

The best way to achieve the loudest possible volume without distortion is to mix the audio using the **Audio>Normalize on Mix** option (as discussed in "Chapter 19: Mixing Digital Audio"). Then, if you want playback to be at a lower volume, use either a lower velocity value for an event, or use MIDI controller #7 to adjust volume. For more information about setting audio event volumes, see "Chapter 16: Adjusting Volume and Pan".

Suppress DSP Sample Rate Conversion Checkbox

This checkbox appears only if you use an AV Macintosh. If the checkbox is unchecked, Studio Vision uses the Macintosh's Digital Signal Processor (DSP) to perform Sample Rate Conversion. This results in slightly better audio quality but limits the number of possible tracks and the synchronization between them. If you do not need to perform sample rate conversions, you should check the **Suppress DSP Sample Rate Conversion** checkbox to free the DSP for more important tasks.

PART 6: Appendix

APPENDIX A: Tips, Audio Idiosyncrasies, and Troubleshooting

❑ Tips

Auditioning Multiple Takes

Audition and compare multiple takes quickly. To do so:

1. **Place multiple takes on different Audio Instruments in one track.**

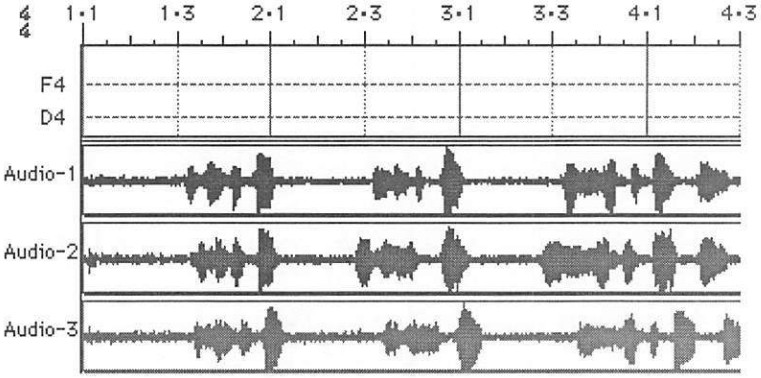


Figure 25.1: Place Multiple Takes on Different Audio Instruments

2. **Use the Audio>Separate command to separate various phrases within each take.**

   Alternately, you could use the **Audio>Strip Silence** command.

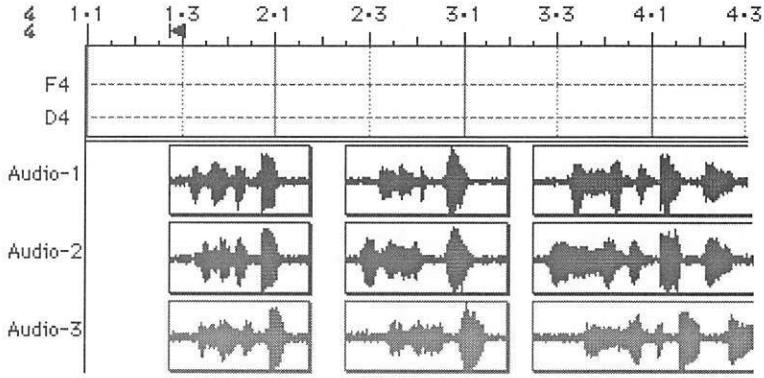


Figure 25.2: Separate the Takes Into Phrases

3. **Audition each Audio Instrument one at a time.**
4. **When you've found all the best takes, select them from the Graphic window by shift-clicking them in the event's upper select region.**
5. **You can audition all the selected events by choosing Do>Play Selection.**

   Studio Vision plays only the highlighted events.

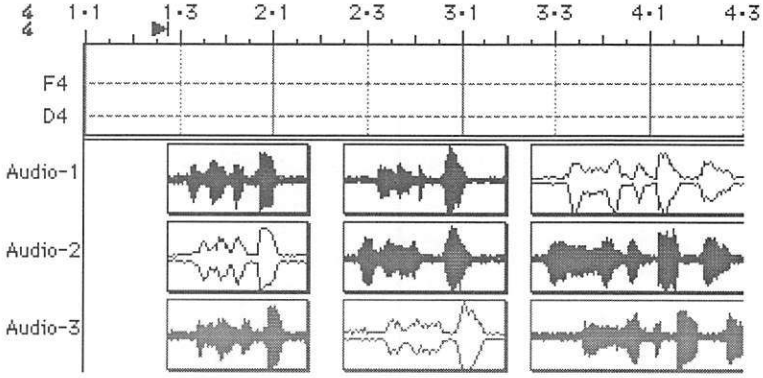


Figure 25.3: Select the Best of Each Take Then Play the Selection

6. **When you're happy with a playback selection, copy the selection to a new track and delete the unsatisfactory takes.**

   Events will still appear on the correct Audio Instruments.

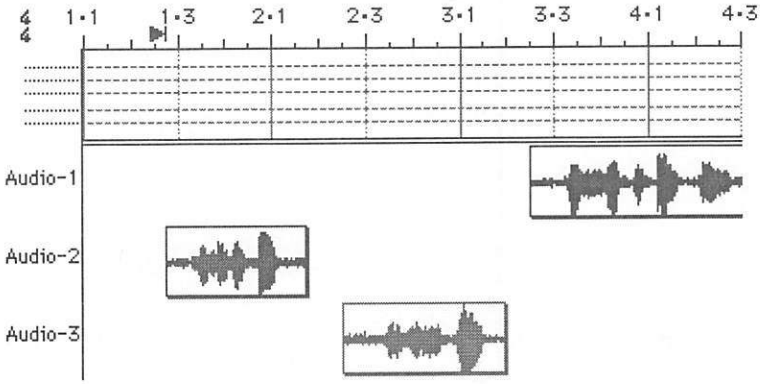


Figure 25.4: New Track Containing Only the Selected Takes

7. **Move all events to the same Audio Instrument by dragging them in the Graphic window.**

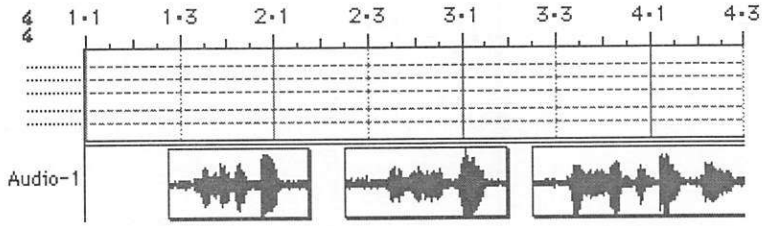


Figure 25.5: New Track After Assigning All Events to the Same Audio Instrument

8. **To conserve disk space, compact the audio in the file that these "takes" were recorded into (as discussed in "Compact" on page 199).**

Playback Precedence

During playback, keep in mind that if a single Audio Instrument on the same track has overlapping audio events assigned to it, each new overlapping event will take the playback channel from the previous event. If the new overlapping event ends before the previous one, then the first event will take the channel back and continue playing. This is especially useful for creating "stuttering" effects as discussed, below.

Creating "Stuttering" Effects

You can obtain a stutter effect by layering multiple copies of an event, or portions of an event, one on top of the other.

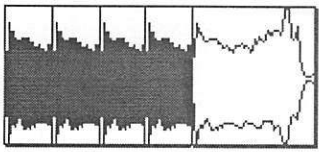
When you Option drag an event, the entire event is copied to wherever you release the mouse. The original event is unaltered beneath the copied event. Only the exposed portion of the underlying event will sound. When playback reaches the next overlapping event, that event will sound.

To create stuttering events:

1. **Move the cursor into the upper left of an audio event.**
   The cursor turns into a Horizontal Move cursor.
2. **Hold down the Option key and drag the event to the right until the copy reveals as much of the original event as you want to hear.**

3. **Release the mouse.**

4. **Repeat the process for as many stuttering events as you desire.**



5. **Play back the track.**
   When playback reaches an event with a later start time, that event will play back and the previous event will be silenced. If you want to view your play state you can do so by clicking anywhere outside of audio events. This displays portions of events that may have been hidden under other events so you can be sure you are seeing what you hear on playback.

NOTE: You could also obtain the same stuttering effect by copying a portion of an event and using the **Edit>Repeat Paste** command. The lengths of the stutter events will be identical only they will not overlap (unless merged).

Undoing Unsatisfactory Takes

If you're recording successive takes into the same record file, use the **Edit>Undo** command immediately after you record to delete an unsatisfactory take. This saves you the extra step of having to compact your file later and, if the Auto Compact option is checked in the Record Monitor window, of having to wait while Studio Vision compacts something you already know you don't want.

When you undo a record, Studio Vision "rewinds" the start point of the next take to the start point of the undone take—effectively writing over it in the audio file so that no unused gaps are left in the audio file.

Delaying Events (Thickening and Slapback Echo)

Enrich the sound of audio events by copying an event, then merging it into the same track on a different Audio Instrument using the **Merge** command in the **Edit** menu. Pan one event all the way left and the other all the way right. Offset the copy by 1 SMPTE frame. For "basement" reverb, offset the copy by 2 or 3 frames.

Quantizing Events

You can tighten up drum tracks by making each drum hit a discrete audio event then using the **Do>Quantize Selection** command.

1. **Select all audio events in the drum track by choosing Edit>Select All.**
2. **Choose Audio>Strip Silence and set the Silence Threshold and Signal Period levels fairly high.**

NOTE: If you are going to mix this track at some future time, make sure you're happy with the event's "velocity" setting. One you strip silence the event, you'll have numerous individual events—all with the same velocity as the initial event. It's easier to set an initial velocity level for one event than it is for many events.

3. **Select all events again.**
4. **Quantize the events using techniques discussed in your Vision Reference Manual.**

Maximizing a Track's Volume After Recording

If you recorded a track with the volume too soft, you can mix it with itself with **Normalize on Mix** checked in the **Audio** menu. The volume will be maximized without clipping the track.

❑ What You Can't Do with Audio Events

Audio Events & Tempo

When you change the tempo of a sequence, the start times of audio events move closer together or farther apart (just like other events) in order to speed up or slow down the playing of the events.

This process operates on individual events whether they're audio events or MIDI events. If you have one long audio event that has many notes in it (a piano solo, for example), Studio Vision can't alter the time between these individual notes, only the start time of that event.

For example, perhaps you have a bass line and a drum track that was recorded as MIDI information on the first two tracks (at a tempo of 100) and then you record your piano as digital audio in one long take on track three. If you then increase the tempo to 130, all of the MIDI events will move closer together in order to play back at the faster tempo; however, the piano audio event will play back at its originally recorded tempo and so be out of sync. This is why it is very important to be satisfied with your tempo before recording digital audio.

It's conceivable that you could separate audio events into individual notes (using either the **Audio>Strip Silence** or **Audio>Separate** commands), although this works best with percussive sounds.

Audio Playback & Screen Updates

Studio Vision requires large amounts of CPU time in small bursts for its disk access. This can make the movements of the Counter display, bouncing ball, and vertical lines jerky on some slower machines.

❑ Troubleshooting

Why don't I hear my digital audio tracks?

If you don't hear any audio, check for the following:

- Make sure you're plugged into the correct hardware output(s).
- Make sure you've set up your Hardware Setup dialog box correctly. (See either "Chapter 10: Hardware Setup with DAE" or "Chapter 5: Hardware Setup with Sound Manager").
- Make sure the Audio Instruments are assigned to outputs (as discussed in "Chapter 15: Working with Audio Instruments").
- Make sure the volume level for that Audio Instrument is not set too low.
- If you're not hearing a signal as you are recording and you are not using a mixer, make sure Thru is checked in the Record Monitor window (see either "Chapter 11: Recording Audio with DAE" or "Chapter 6: Recording Audio with Sound Manager". The Thru option enables you to hear the thru input signal as you are recording).

If you hear clicks and pops on playback, make sure AppleTalk is turned off.

Why don't my pickups work?

Pickups will not work if any part of an audio event—even an event that doesn't contain data—is before the pickup start point. You will have to remove any audio events or portions of events that are before your pickup point. Do this manually in the Graphic window or by changing the Start edit times in the List window.

What if I'm running out of hard disk space?

If Studio Vision alerts you that you're running out of disk space, you can do the following:

- Delete any unused sound files.

  The File Management dialog box can display which files are used by the current sequence file, but it can't display which ones are used by other files.
- Compact any sound files with unused portions.

  The File Management dialog box can display which portions are used by the current sequence file, but it can't display which ones are used by other files.

What if my hard disk is too slow?

You will see the alert warning you that your hard disk it too slow or fragmented if Studio Vision doesn't have enough time to get the data off the disk. This is usually caused by an excessively slow hard disk, or excessive disk fragmentation. You can buy a faster hard disk, or you can use programs such as DiskExpress from Alsoft or Norton's Speed Disk to defragment the hard disk that you use to record digital audio.

NOTE: You do not have to remove Studio Vision in order to run your defragmenting software—Opcode's new copy protection techniques allow defragmenting software to work without removing the program. You may, however, wish to remove older copy-protected software that may be on the disk (or copy-protected programs from other companies) since they may use old-fashioned copy protection techniques that will result in data loss if the disk is optimized. Check the manuals for any old copy protected software that may be installed on the disk you wish to optimize.

If possible, have your system and application on one hard disk, and record digital audio onto another, fast hard drive.

You may also see an alert if there is insufficient CPU time. If you are using MIDI Manager, turn it off. If you have any System Extensions that run all the time, try removing them. If you own an older Macintosh (such as a Mac II or IIx) consider a Logic Board upgrade.

Why are my audio and MIDI tracks out of sync?

If audio and MIDI aren't in sync:

- Make sure AppleTalk is off.
- Make sure your audio volume and pan controllers have a low density—as low as possible without hearing steps. Keeping all audio controllers to a simultaneous total of less than 2% MIDI bandwidth is recommended.
- Make sure you haven't changed the sequence's tempo or tape calibration since recording a long audio event.

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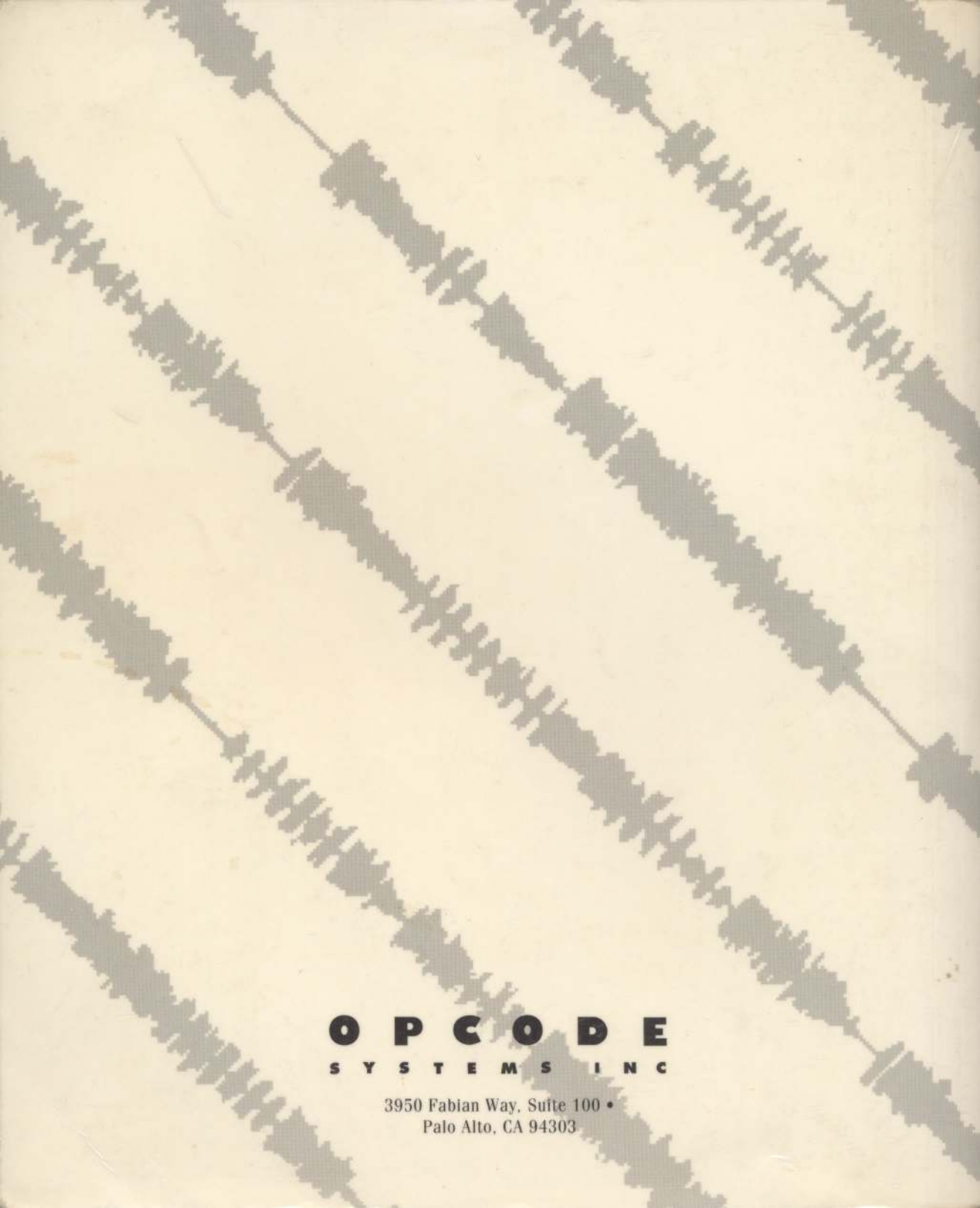

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